

Coal Age



GETTING IDEAS ... p 70

Buffalo Creek Story • Mechanical-Mining Power
Compact, Flexible Tipple • Modernizing Haulage
Thick-Seam Mining • Safety Under Bad Conditions



99%

OR NOTHING?

► Could a broken part in your coal haulage system shut down your mine...

OR DO YOU HAVE **MINE CARS?**

Anyone who's had a 'continuous' coal haulage system go bad will tell you...*there's nothing like mine cars for constant haulage!*

Just look at what happens when a mine car gets troublesome (as *all* machinery must, at one time or another).

Fast, the offending car goes off onto a siding. The rest of your cars keep moving, while your

own maintenance men are fixing it. The men running the big machines at the face probably never even know there's been a delay. From the cutters to the tippie, your coal never stops moving for more than a minute or two...*when you have mine cars.*

That's the sort of coal-hauling system that keeps a mine in the black, month after month after month. It just takes good cars and a well-planned system. Your nearby A.C.f. Representative can help you with both. Next time you consider any changes, call him in.

A.C.f.

MINE CARS

for Constant Haulage

AMERICAN CAR AND FOUNDRY COMPANY

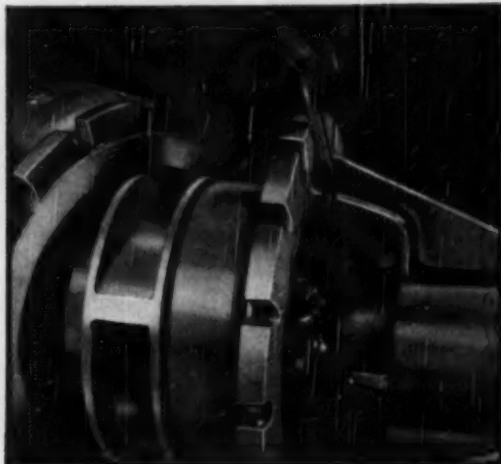
New York • Chicago • St. Louis • Cleveland • Washington • Philadelphia • San Francisco • Pittsburgh • Huntington, W. Va. • Scranton, Pa.

Remove Rotating Element in 5 Minutes!

ALLIS-CHALMERS COAL WASHING PUMP



1. Remove Casing Bolts lift and disconnect drive. Just loosen bolts and bolt assembly from slot. Bolt, nut and washers are still connected for easy reassembly.



2. Swing Out Rotating Element. Neither suction nor discharge piping need be disturbed. All wearing parts are fully accessible for inspection or servicing.

THE PUMP IS BACK IN SERVICE IN LESS THAN A HALF HOUR

QUICK, EASY SERVICE AND LONG RUNS between servicings are the two things operators want most in coal washing pumps. You can see for yourself how quick and easy service is with an Allis-Chalmers Coal Washing pump.

You get long life, too, because Allis-Chalmers Coal Washing Pumps are made of special hard *Allisite* alloy . . . because they have thick sections and heavy parts throughout . . . and because they are application engineered by specialists who know coal washing problems and how to solve them.

Get complete information on Allis-Chalmers Coal Washing pumps from your nearest Allis-Chalmers Sales Office. Or write for Bulletin 08B6381.

ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

A-3213



ONLY FIVE WEARING PARTS

Shaft sleeve, impeller, casing, two wear plates. All easy to handle and easy to replace.



ALLIS-CHALMERS

The Champion

THE MESSENGER BOY - WHO MADE A BRIDGE FAMOUS



He was only an unknown youngster working in a Brooklyn branch office of Western Union on the night shift. But when his pal Willie boastfully dared young Steve to jump with him off the Brooklyn Bridge, Steve took up his dare. The next morning, July 26, 1886, on the way home from work, Willie, Steve and their pals met on the Bridge. Willie's nerve failed . . . "I was only kidding," he quavered. "I wasn't!" said Steve Brodie, and went over the rail. The rest is history. Steve was pulled safely out of the water into enduring fame - and went back to work that night as if nothing had happened . . . a modest Champion whose feat, done on a dare, became part of American folklore.

HULBURT-OIL & GREASE COMPANY, PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

The Champion

...IN COAL MINE LUBRICATION



Hulburt Quality *"The Champion"* **GREASE**

We won't "dare" you to try Hulburt Quality Grease — because you'll be taking no chances . . . you'll be CERTAIN of satisfaction. When you jump off old standards of lubrication and let a Hulburt Engineer go down into your coal mine and show you a better way to do things, you'll find your mining machines, once suffering from improper lubrication, going back to work as if nothing had happened — thanks to the QUALITY of the one Grease made to do one job and do it supremely well — HULBURT.



**DON'T LET MINUS 200 MESH, HIGH ASH FINES
GET IN YOUR HAIR!**

What to do with fines has become an increasing headache.

When preparation plants are bottled up, the solids in the circulating water may build up too much.

When high ash fines are shipped with the coal, customers don't like it.

Sludge ponds simply postpone the headache. What to do? Look into the Bird Polishing Filter. It segregates all or part of the extreme fines so you can discard them with the refuse.

Ask us to tell you what the BIRD can do for you.

BIRD MACHINE COMPANY
SOUTH WALPOLE • MASSACHUSETTS



THIS MONTH'S COVER

• **ADOPTING** this bridge conveyor to boost output from 10 to 20 tons per man, with more expected, at Johnstown Coal & Coke is but one of the prime examples of how to get and profit by more and better ideas in this month's lead article, "Getting Ahead With Ideas," starting on p 70. Would more ideas help you make your job better? Are you using the three basic ways to develop ideas this story suggests? You'll find this feature mighty interesting—and personally profitable, too.

COMING IN COAL AGE

- **The Chieftan No. 20 Story**—Unusual stripping methods, a new-type dragline and a new company-erected all-welded preparation plant highlight this Maumee Collieries operation.
- **Anthracite's newest deep-mine operation**—A complete description of the methods and equipment in use.
- **How sprayed plastic film can help improve ventilation** by sealing stoppings and reducing air losses—What the material is, how it is applied and what it offers in results.
- **The Executives' Panel**—Leading off a new COAL AGE feature, in which coal men are invited to say what they think on important questions of the day.

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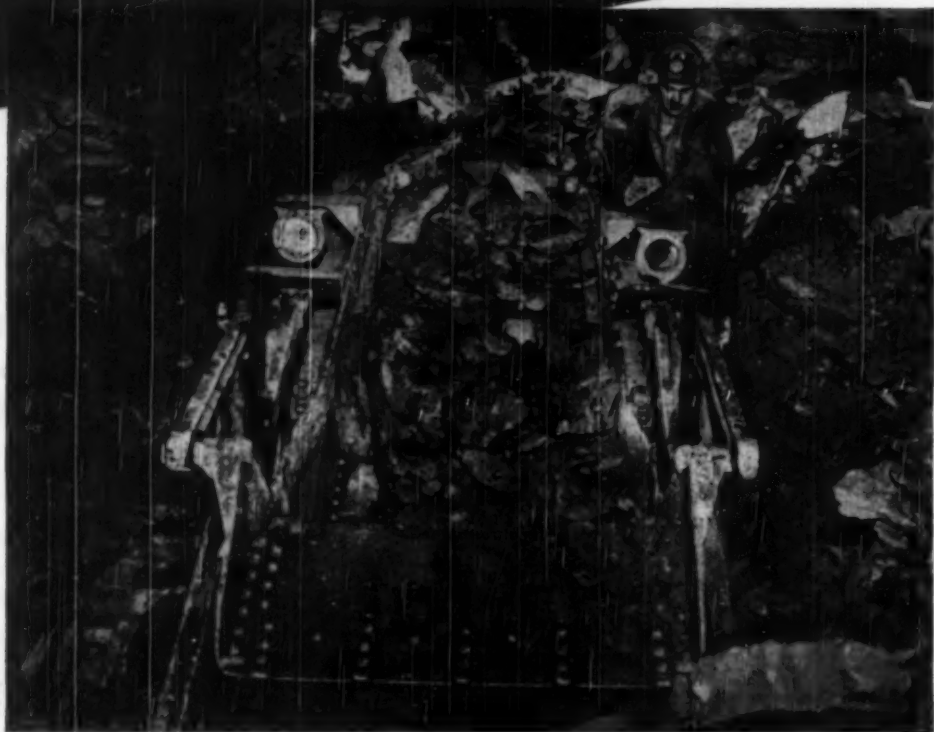
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KEEP 'EM LOADING



*Photo Courtesy
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presents MILTON BERLE
on television
every Tuesday night.
METROPOLITAN OPERA
radio broadcasts every
Saturday afternoon.



TEXACO LUBRICANTS

... by keeping hydraulic
systems free of rust and sludge
with **TEXACO REGAL OILS (R&O)**



Texaco Regal Oils (R & O) are highly refined turbine-grade oils. They are oxidation-inhibited and "plate" inner metal surfaces to keep moisture from reaching them — thus protecting against rust.

Texaco Regal Oils (R & O) keep the hydraulic systems in your loaders, cutters, shovels and trucks clean for smooth trouble-free performance . . . minimize wear of all moving parts in pumps and valves. Fewer drainings and overhauls are necessary . . . you reduce your maintenance costs.

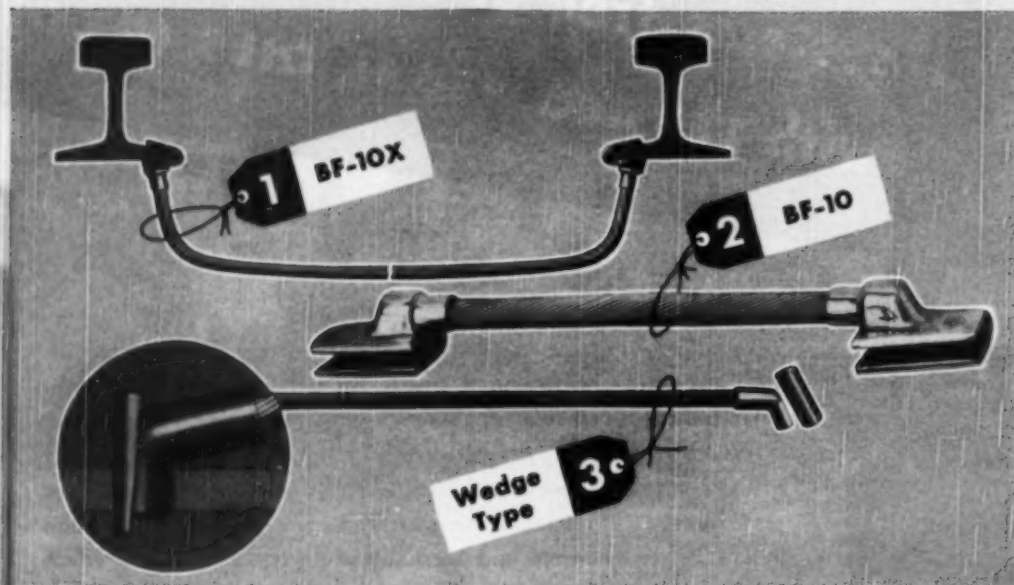
Texaco Regal Oils (R & O) require no "cutting back". They are available in every needed viscosity to meet all operating conditions. Leading makers of hydraulic equipment recommend *Texaco Regal Oils (R & O)*.

To assure easier starts and smoother rolling for mine cars, even in deep winter weather, lubricate wheel bearings with tenacious *Texaco Olympian Grease*. This long-lasting lubricant stays in the bearings, reduces upkeep costs.

A Texaco Lubrication Engineer will gladly help you select the proper lubricants for your operation. Just call the nearest of the more than 2,000 Texaco Wholesale Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

For the Coal Mining Industry

These 3 bonds are 3 good reasons why
U-S-S American Tigerweld Rail Bonds
 are so popular with maintenance men:



1 The BF-10 Bond:

This reversible bond is designed for installation at rail joints of permanent trackage. The strand can be installed atop the rail base, or, for maximum protection against derailment, under the rail base. The BF-10 Bond is self-clamping... application of the bond, including the forming of the strand, can be effected without the aid of clamps or other holding devices before welding. And because it is so highly resistant to vibratory stresses, the BF-10 Bond assures long service and keeps power flowing year in and year out.

2 The BF-10X Bond:

This Cross Bond is a companion of the BF-10 and possesses the same desirable qualities... it's easy to in-

stall, long-lasting, efficient. A few taps with a hammer secure the self-clamping terminals to the rail where they remain firmly in place while a steel-to-steel weld is applied. No special clamps needed. The heavy cable of the BF-10X will withstand severe and constant vibration.

3 The Wedge-Type Bond:

Designed primarily for installation on temporary trackage, the Wedge-Type Bond holds so well that many mines use it for permanent trackage, too. It is easy to install. Just hammer each wedge three times and the bond is on. No welding... no lugging of heavy equipment necessary. Yet despite its simple application, the Wedge-Type Bond holds with a grip that won't shake loose. When used on temporary trackage it can be used again and again. Just hammer out the wedge and it is ready for

more rugged service in a new location. The Wedge-Type Bond has copper terminals and drop forged steel wedges.

(1), (2), (3): All of these are Tigerweld Bonds—all butt-welded. That means that in every case all the wires are electrically connected, permanently, to the solid end pieces. Butt-welding will constantly develop full strength of the strand on a tensile test to destruction.

There are many other U-S-S American Tigerweld Bonds available—welded types, plug types, or splice bar types. Contact your nearest sales office for complete information, or write for our new catalog.

AMERICAN STEEL & WIRE COMPANY
 GENERAL OFFICES: CLEVELAND, OHIO
 COLUMBIA STEEL COMPANY, SAN FRANCISCO
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American Tigerweld Rail Bonds

UNITED STATES STEEL

*Get The Capacity.
Speed and Ruggedness You Need*

GOODMAN TRACTOR TREAD LOADERS

TYPE 660 . . . a low height, fast working, 8 to 10 ton per minute loader with a swinging head that cleans up an 18 foot path with only forward and backward maneuvering, loads around timbers and on curves. Upkeep expense has proved consistently low.



GOODMAN
MANUFACTURING
COMPANY

HALSTED STREET AT

IN TRACKLESS MINING

GOODMAN SHUTTLE CARS

TYPE 570 . . . a 48" high, cable reel car with a water level full capacity of 210 cubic feet. It has an adjustable height discharge conveyor, four wheel drive, four wheel steer, and four wheel brakes.



ATTENTION: Users of Goodman Type 512 Shortwalls . . .

Time and money saving advantages are being reported in every instance where Type 512 machines have been equipped with Bugduster units for automatic handling of cuttings. These units can be installed at the mine on any 512. Check now with your Goodman field representative.

48TH • CHICAGO 9, ILLINOIS





ABANDONED

Heyl & Patterson

CYCLONE THICKENER EQUIPMENT Made Possible the ELIMINATION of these SLUDGE PONDS

In April, 1950, Heyl & Patterson Cyclone Thickener Equipment was installed at the Warwick Plant of the Duquesne Light Company, for the purpose of Closing the Plant Circulating Water System.

Prior to this, the solids in the circulating water were controlled by intermittently bleeding 200 to 300 gallon per minute when the circulating water approached 30% solids. Since the H&P Cyclones have been in service, the circulating water has been maintained constantly at approximately 15% solids.

The Heyl & Patterson Cyclone Thickener Equipment is very simple, consisting of: one H&P Manifold, mounting twenty-two 3" diameter cyclones; a Robins Vibrex 36" x 72" Dewatering Screen; a Hazelton 4" Centrifugal Slurry Pump.

The Heyl & Patterson Cyclone Thickener Equipment has made possible: Closed Circuit Operation . . . Elimination of Sludge Ponds . . . a more Uniform Washed Product . . . Recovery of approximately 2¼ tons per hour of 28 mesh x 0 Coal of marketable quality . . . Greater Tonnage of Washed Coal without Increase in Ash.

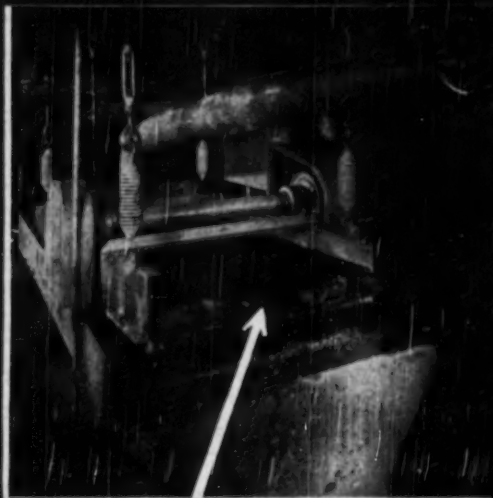
CLOSED CIRCUIT OPERATION

at the **WARWICK COAL PREPARATION PLANT**
of **DUQUESNE LIGHT COMPANY**



The Cyclone Thickener Unit, shown here, processes 250 G.P.M. of circulating water, having a concentration of 15% solids. The clarified overflow from the Cyclones is returned to the water system. The 26 G.P.M. of densified underflow slurry at 55% solids concentration flows by gravity to the high speed dewatering screen.

The 36" x 72" Robins Vibrex Screen, equipped



with $\frac{1}{2}$ M.M. opening wedge wire deck, receives the thickened cyclone underflow and dewateres the slurry to form a 30% moisture product and returns the effluent to the water circuit. The 30% moisture product is readily handled mechanically. The recovered product is loaded out with the prepared coal for use in the Power Stations of Duquesne Light Company.

One Bridges
Railroad Car Dumpers
High Lift-Turnover-Rollers
Coal Preparation Plants
Coal & Coke Handling Equipment
Belt Loaders and Unloaders
Rotary Mine Car Dumpers
Coal Crushers
Coal Storage Bridges
Car Hauls & Belt Movers
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Pig Iron Casting Machines
Cyclone Thickeners
Thermal Dryers

**Heyl & Patterson Engineers are at your service . . . to
consult with you . . . to investigate your particular
problems and to make the proper recommendations.**

Heyl & Patterson, Inc.
"SINCE 1887"

55 WATER STREET PITTSBURGH 22, PA.

Check YOUR output against

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
50'-300'	31	310	Man Construction Co. Peori, Ill.	2 C Tournapulls leveling 100,000 yds. for Lagan County Airport at Lincoln, Ill.	Common earth and clay.	No established haul roads due to scattered grading. Occasional heavy rains.
100'	Not measured	125 self-loaded	Griggs County Soil Conser- vation District, Casperstown, N. D.	1 D Roadster digs 254 yd. drainage ditch near Austin, N. D.	Sandy loam.	Normal.
175'	35	90 self-loaded	Griggs County Soil Conser- vation District, Casperstown, N. D.	1 D Roadster digs drainage ditch on farm near Casperstown, N. D.	Black loam.	Typical drainage ditching.
200'	42	450	Shaw Anderson, Contractor Lyle, Minn.	2 C Tournapulls on 105,000 yd. Stevens County road job south of Alberta, Minn.	Loam and clay.	Average.
200'	30	150 self-loaded	Ray Jones, Contractor Springfield, S. D.	1 D Roadster building series of 1100 yd. soil conservation dam in Edwards County. Schedule includes one dam per day.	Sandy clay and gravel.	Material run-bank, extremely dry.
200'	25	137.5 self-loaded	Ray Solt, Contractor Springfield, Ohio	1 D Roadster grading 45,000 yds. for indus- trial plant site at Yellow Springs, Ohio.	Mostly loam, clay; with occasional gravel.	Good weather, level grade.
325'	15	176.5	Estrelita Tassilo C. F. Sereya e Rouf, Sao Paulo, Brazil	2 C Tournapulls grade 1,045,000 yds. for new Sao Paulo government housing project in Congaui, Brazil.	Heavy, wet clay.	Continuous tropical rains soak material, cut working time to 6 days a week.
300'-400'	22.9	125 self-loaded	C. H. Williams, Contractor Faulkton, S. D.	1 D Roadster on soil conservation dam near Faulkton, S. D.	Dry, sandy clay.	Hard material, 15-17% grades on return haul.
300'-500'	20	120 self-loaded	William Chander, Contractor Cawm, Mich.	1 D Roadster levels 25,000 yd. subgrade for 550-home Royal Oak subdivision near Bu- tch, Mich.	Topsoil and clay.	Tight quarters . . . hauling and spreading 6 m a s lowest and fastest.
425'	20	80 self-loaded	Democratization for Cuba County Highway Dept., Hofia, Ala.	1 D Roadster on county road improvement near Hofia, Ala.	Hard, rocky clay.	Tough material required road- ing, loaded with high loads.
500'	24	Not measured	Griffin Construction Co. Philadelphia, Pa.	2 D Roadsters on 600,000 yd. landfill for Lyonswood Gardens housing project, Phila- delphia, Pa.	Sand, topsoil.	Up 20% approach grade to top of electric.
500'	17	170	John F. Walter, Contractor Pawlet, Mich.	2 C Tournapulls build settling area for com- post disposal system at Camp Grayling, Mich.	White Michigan sand.	Very loose, very abrasive material.
500'	14.25	150	Anderson Bros. Eastford, Ill.	1 C Tournapull on 100,000 yd. levee to pro- tect casing plant site of Mendota, Ill.	Sticky clay and topsoil.	Head road often 12" deep in water.
550'	16	176	Venole Jari, Contractor Gresham, Ore.	2 C Tournapulls on 5 1/4 mile, 410,000 yd. relocation of Rt. 101 near Tillamook, Ore.	Sand, gravel, hardpan, clay, and heavy top- soil.	Material softened by heat- ed heavy rains.
600'	20	200	R. V. McElroy Construction Co. Beverly, Ill.	1 C Tournapull on 663,000 yd. bridge ap- proach and relocation of U. S. 40 near Gresham, Ill.	Hard-packed clay.	Return 300' up 21% grade to cut.
600'	20	200	Isabel Construction Co. Reno, Nev.	2 C Tournapulls on 17.4 mi., 315,000 yd. road construction near Elko, Nev.	Mixed sandstone, clay, loam.	10% return grade, 6000' al- titudes.
600'	13	117	Central Waterways Imple- ment & Navigation Com. New Delhi, India	2 C Tournapulls on 25,000,000 yd. Mithank Dam across Mahanadi River in India.	Hard, rocky clay.	100' of 20% grade. Very rough haul road.
600'	11	135	Mohr, Kleiderer and Morris Construction Co. Charlottesville, Va.	1 C Tournapull on 1,200,000 yd. expansion of railroad yard at Russell, Ky.	Loose, dead sand.	Yough-loading material. Un- stable haul road.
650'	23.5	235	Man Construction Co. Peori, Ill.	2 C Tournapulls leveling 100,000 yds. for Lagan County Airport, Lincoln, Ill.	Common earth and clay.	No established haul roads. Very heavy rains.
660'	17.6	Not measured, self-loaded	Taplin & Slater, Inc. Hazel Park, Mich.	4 D Roadsters move 450,000 yds. for new race track near Detroit, Mich.	Topsoil.	Precision spreading.
700'	15	75 self-loaded	Sorenson Bros. Morrey, Utah	1 D Roadster build-leads 15,000 yds. at Jerome Ranch, Salt Lake City, Utah.	All clay.	Rough haul roads.
700'	13	117	Schultz and Lindsay Forge, S. D.	2 C Tournapulls on 300,000 yd. Riverdale, N. D., housing project for Garrison Dam workers.	Sandy clay and loam.	Normal.
700'	15	150	R. G. Young & Sons Johnson City, Tenn.	2 C Tournapulls grade 130,000 yds. for air- port at Greenville.	Common earth.	Head up 6% grade.
450'-750'	10	100	Pythian Bros. Yasson, Minn.	2 C Tournapulls strip 65,000 yds. of overbur- den from gravel pit at Cranston, Minn.	Sticky, wet clay, loam.	"Shot-down" weather condi- tions, 250' haul up 12% grade, 310' over bank - deep, soft soil.
800'	18	180	Isabel Construction Co. Reno, Nev.	2 C Tournapulls on 17.05 mi., 315,000 yd. road construction north of Elko, Nev.	Sand, loam.	7% adverse grade on return, 6500' altitude.
800'	14	84	Hague Construction Co., Inc. Barbours, Calif.	1 D Roadsters grade 70,000 yds. for new housing project at Van Nuys, Calif.	Sandy loam.	Average.
850'	7	Not measured	Henry Thygesen, Contractor Albuquerque, N. M.	1 C Tournapull on highway construction near Salem, N. M.	Loose, powdery blow- sand.	Cuts sprinkled to speed load- ing. Loose hauling all the way.
800'-1000'	7	77	Venole Jari, Contractor Gresham, Ore.	2 C Tournapulls on 5 1/4 mile, 410,000 yd. relocation of Rt. 101 south of Tillamook, Ore.	Sand, gravel, hardpan, clay and topsoil.	Material softened by heat- ed rainfall in U. S.
950'	14.5	90 self-loaded	Ray Solt, Contractor Springfield, Ohio	1 D Roadster grading 45,000 yds. for new industrial plant in Yellow Springs, Ohio.	Loam, clay, gravel in spots.	Head grades up to 10%.
1000'	11.5	115	Gross Construction Co. Olaton, Ind.	2 new C Tournapulls, 5 Super C Tournapulls haul 500,000 yd. airport at Greensboro, N. C., 150 days ahead of schedule.	Heavy, water-logged clay.	October rains made job un- workable for all with ex- cept new Tournapulls.
1000'	16	144	"Birdseye" Minneapolis, Minn.	2 C Tournapulls grade 45,000 yd. addition to Wald Chamberlain Airport, Minneapolis.	High-void red, topsoil.	Normal . . . material dry.
1100'	8	104	Cia Asessoria Portuaria, Cruzeiros, Cuba	4 C Tournapulls on 175,000 yd. earthfill dam in Central Estrella, Cuba.	Hardpan, clay, and sand.	Head up 3 to 25% grade.

LETOURNEAU



TOURNAPULLS

PROVED BY 13 YEARS OF RUBBER-TIRED TOURNAPULL PERFORMANCE

these **TOURNAPULL** JOBS

HAUL one way	TRIPS per hour (per unit)	PAY YARDS per hour (per unit)	Name of Owner	Job Description	Type of Material	Job Conditions
1100'	13.3	70 self-loaded	Lawrence County Highway Dept., Moulton, Ala.	1 D Roadster on 11 miles of new farm-to-market road near Moulton, Ala.	Typical Alabama red clay.	Average condition.
1100'	17	104	Lawrence County Highway Dept., Moulton, Ala.	1 D Roadster pusher-loaded on same Moulton road job.	Alabama red clay.	Average condition.
1200'	15	150	Curran Construction Co., Toccoa, Ga.	3 C Tournapulls build 370,000 yd. 80 across shallow lake for Central Florida through highway near Hialeah City.	Loose, hard-loading sand.	Heat 400' over sand, 600' over new road bed.
1200'	10	50 self-loaded	Stiles & Frymoyer Construction Co., Columbus, Ohio	1 D Roadster used on building haul on 15-mile, 170,000 yd. subgrade for U. S. 30 in Grant and Wyandot Counties, Ohio.	Tegull, clay and silt.	Load around poles, culverts. Heavy load road with rock trucks, other traffic.
1250'	14	84	Hutchinson & Wyatt, Sandyville, W. Va.	2 D Roadsters graded footways at Raleigh County Airport, Charleston, W. Va.	Backhard, un-baked clay.	Extremely dry, tough material.
1250'	12	125	Haley, Chisholm & Morris Construction Co., Charlottesville, Va.	1 C Tournapull on 1,200,000 yd. railroad yard expansion at Russell, Ky.	Loose, abrasive sand.	Rough, giffed haul.
1250'	9	103.5	Anderson & Sweeney Springfield, Ill.	2 C Tournapulls on 125,000 yd. grading for Mordale Airport near Carbondale.	Sandy loam.	Ideal weather, material, but rough haul roads.
1400'	10	105	Haley, Chisholm & Morris Construction Co., Charlottesville, Va.	1 C Tournapull on 1,200,000 yd. expansion of railroad at Russell, Ky.	Sand.	Fitted, smooth haul road.
1500'	20	200	Peterson Bros., Toccoa, Miss.	2 C Tournapulls ship 55,000 yd. of over-burden from gravel pit at Cranshaw, Miss.	Common earth, clay.	Up 17% grade for 350' ... otherwise excellent haul roads permitting travel in 5th gear.
1600'	9.5	114	A. F. Schmitt, Contractor LaCrosse, Wis.	1 C Tournapull on 120,000 yd. swamp fill for U. S. 12 and 19 near Mauston, Wis.	Swamp sand.	Material loaded under water, loaded up 4 to 8% grades. Poor traction.
1600'	17.5	105	Seddon & Sivil, Inc., Grand Fork, Mich.	4 D Roadsters grade, build 450,000 yd. race track near Detroit, Mich.	Fill 9" sand, 8" clay, 3 1/2" tegull and clay.	Precision spreading, banking on track. Travel through traffic on paved roads.
1700'	10	50 self-loaded	Sam Glasgow, Contractor Glasgow, Pa.	1 D Roadster, leveling industrial plant site in Philadelphia, Pa.	Sandy clay.	Average condition.
2000'	9	108	Hells L. Tarr Co., Durham, N. C.	4 C Tournapulls build 450,000 yd., 1100' embankment across tidal inlet swamp in U. S. 109 between Washington and Annapolis, Md.	Ocean silt and sand.	Steep cuts. Material dumped to displace soft swamp mud.
2250'	8	36 self-loaded	Reconstruction for Clarence County Highway Dept., Heflin, Ala.	1 D Roadster on cut and fill work for secondary road near Toccoa, Ala.	Common earth.	Normal.
2400'	8.2	78	Moore Bros., Inc., Marquette, Minn.	2 C Tournapulls rehabilitating 370,000 yd., 11.3 miles of Hwy. 81 north of St. Mary, Minn.	Tough, sticky gumbs.	Haul over rough, rocky roads.
2625'	14.3	163.5	Regalla Vicens, Contractor Mexico City, Mexico	2 C Tournapulls widen embankment for spur rail line to Pomas Railway, Ahuacatlan, Mexico.	Compacted tegull.	Hard, dry material.
2640'	10	60	W. B. Bennett Paving, Ltd., Oshawa, Ontario	3 D Roadsters handle 7,000 yd. subgrade for city street in Oshawa, Ont.	Sandy clay mixed with small stones and old road-surfacing material.	Load around man holes, get lines in street. Haul 75 ft. through traffic and across busy intersections.
3000'	7	70	R. V. McElroy Construction Co., Decatur, Ill.	1 C Tournapull on 643,000 yd. relocation of U. S. Hwy. 40 near Graceland, Ill.	Hard-packed clay.	Return 400' up 17 to 21% grades. Spooky fill.
3200'	7	42	Chippewa County Highway Dept., Chippewa Falls, Wis.	1 D Roadsters on 160,000 yd. relocation of Highway M in Chippewa County, Wis.	Glacial sand.	Abrasive materials. Level haul.
3100'-3350'	6.4	32 self-loaded	Griggs County Soil Conservation District Cooperstown, N. D.	1 D Roadster repairs township road in Griggs County, N. D.	Hard, dry clay.	Hilly.
3750'	10	100	Wylie Brothers Albuquerque, N. M.	2 C Tournapulls handle 85% of 163,000 yd. highway job east of Hobbs, N. M.	Sandy clay.	Haul 500' across field, make sharp turn on to highway, travel 1250' in traffic.
3500'-4000'	7.5	82.5	Hells L. Tarr Co., Durham, N. C.	4 C Tournapulls build 450,000 yd., 1100' embankment across tidal swamp for relocation of U. S. 50 between Washington and Annapolis, Md.	Ocean silt and sand.	Steep cuts. Material spread on soft swamp fill to displace mud.
4000'	8	80	R. V. McElroy Construction Co., Decatur, Ill.	1 C Tournapull on 643,000 yd. relocation of U. S. Hwy. 40 near Graceland, Ill.	Clay.	Return 400' up 17 to 21% grades. Spooky fill.
4000'	5	35	Hest Brothers Greenville, Tenn.	1 D Roadster filling in between foundation walls and columns of tobacco warehouse at Greenville, Tenn.	Extremely hard, dry clay.	Load, dump in narrow lanes between warehouse walls, columns.
4400'	5	22.5 self-loaded	Dane County Highway Dept., Madison, Wis.	3 D Roadsters improve city streets in Falmes, Wis.	Sand, gravel.	Haul through traffic. Spread in soft mud holes.
4500'	5.5	60.5	G. F. Teft, Contractor Nottville, Mich.	2 C Tournapulls handle final grading on 1,000,000 yd. expansion of Wayne Major Airport near Detroit, Mich.	Sand, clay, and tegull.	Thin cut, shallow fill, good weather.
5940'	5	Not measured	John F. Walser, Contractor Pantier, Mich.	2 C Tournapulls grade, gravel 2 mi. of access roads in Camp Grayling, Mich.	Gravel, sandy loam.	Loose, abrasive material.
7920'	4	48	A. L. Over & Sons McBriston, Iowa	3 C Tournapulls on 1 mi., 210,000 yd. Hwy. 57 job west of Carson City, Mich.	Tegull, clay and fine sand.	Part of haul over existing highway through heavy traffic.

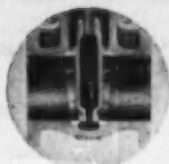
Note { C TOURNAPULL—13.5 yds., speeds to 35 m.p.h.
D ROADSTER—7 yds., speeds to 28 m.p.h.

Short hauls or long—

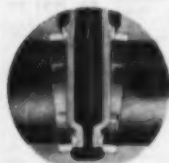
all types of scraper materials, under all job conditions, big jobs, little jobs, anywhere dirt is moved . . . Tournapull speed, versatility, and low cost of operation add up to lowest net-cost-per-yard. Check YOUR job records against those listed above . . . then see your International Distributor for complete information on what these electric control, rubber-tired Tournapulls can do for YOU.



LET



Straight-Flow Port Design reduces fluid turbulence to a practical minimum.



Boot Rings of end-seated type are screwed into the body.



Sure-Grip Malleable Handwheel for non-skid gripping even with heavy gloves.



Brass Liner on Glands assures greater resistance to corrosion and scoring.



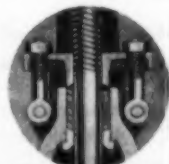
T-head Disc-to-Stem connection on OS&Y types provides stronger connection, prevents loosening of disc by corrosion.



Bronze Back-Seal Bushings in bonnets of OS&Y valves.



Solid Web Type Disc in OS&Y valves for greater strength and longer service.



Hinged Gland Eye-Bolts on OS&Y valves permit faster, easier repacking under full pressure.

WALWORTH

iron body gate valves

with screwed or flanged ends



For complete information on these new Walworth Iron Body Valves, see your local Walworth distributor, or write for bulletin 106.

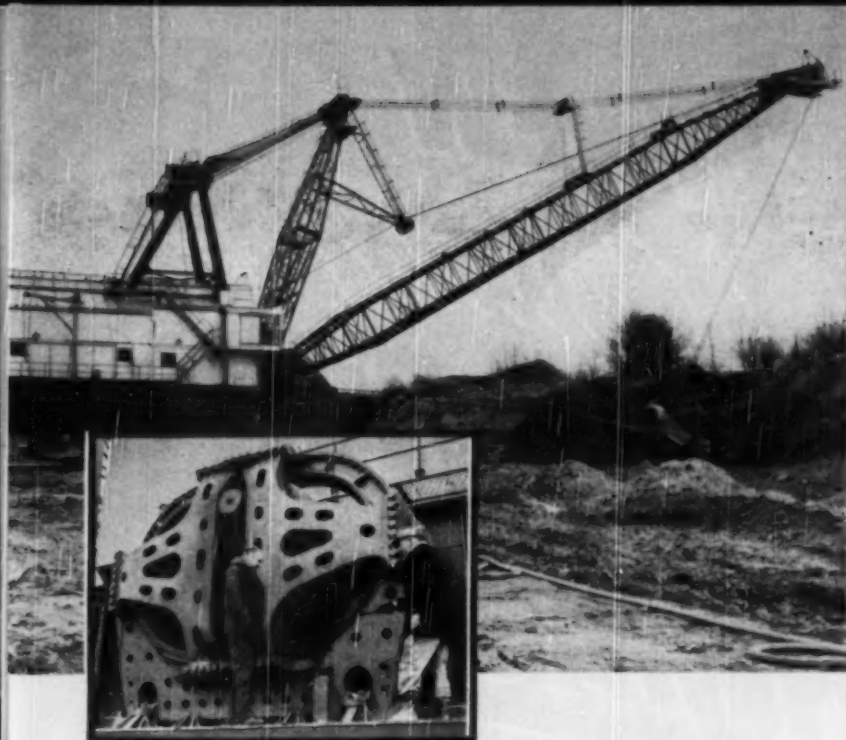
... 8 Outstanding Features

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DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD



Helps "walking" dragline put best foot forward . . .

When this 1280-ton dragline was first put into operation at a large midwest surface mine, its operators gave special attention to the lubrication of the walking cams. They particularly wanted to use a lubricant that did not have to be heated for application. When one such a product was tried, however, it failed to cushion cam action. Vibration was excessive.

A Standard Oil lubrication specialist recommended the use of Standard Oil's **HEAVY-DUTY CAM AND GEAR LUBRICANT**. A trial convinced operators that it was the product they wanted. Because the **HEAVY-DUTY CAM AND GEAR LUBRICANT** can be applied in solid form, application was easily handled by one man during moving operations. The lubricant did not tend to cake or harden but formed a strong lubricating cushion that minimized vibration of the walking cams. Only small amounts of the product were required to provide good lubrication.

Today, after 1 1/2 years' operation of the dragline, mine operators report that the use of **HEAVY-DUTY CAM AND GEAR LUBRICANT**



has meant important savings through low lubricant consumption, minimum time and labor for its application, and trouble-free lubrication of the walking cams.

Savings such as these have been brought to a host of midwest mines by Standard Oil's lubrication engineering service and high quality products. How these service and product advantages can help you is explained at the right.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

What's YOUR problem?



Fred A. Barnes, lubrication specialist at Standard Oil's Decatur office, helped this midwest mine (see left) make important savings with Standard Oil's **HEAVY-DUTY CAM AND GEAR LUBRICANT**. He was close at hand, gave operators on-the-spot engineering service that was vital to the solution of their lubrication problem.

There's a corps of Standard Oil lubrication specialists throughout the Midwest. You'll find one located near your mine. You can contact him easily and quickly through your local Standard Oil (Indiana) office. Use this man's special training and practical experience to help you make real savings. He offers a complete line of mine lubricants including special-purpose **HEAVY-DUTY CAM AND GEAR LUBRICANT** and such widely used products as:

STANOIL Industrial Oils—Simplify your lubrication jobs by using this one line of oils that provides cleaner operation of loader and crane hydraulic units, supplies effective lubrication in compressors, gear cases, and circulating systems.

SUPERLA Mine Lubricants—These new, improved oils and greases provide better lubrication of cutters, loaders, locomotives, mine cars, and other underground equipment. They eliminate transmission-case deposits, reduce clutch-plate gumming, and minimize wear on gears and bearings.

CALUMET Viscous Lubricants—On open gears and wire rope, these greases resist washing and throw-off. Their superior wetting ability affords better coating of gears and better internal lubrication of wire rope.

STANDARD OIL COMPANY (INDIANA)



THE GREAT NEW *Mid-Century* U.S. ROYAL FLEETMASTER

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NEVER BEFORE have mining men had the right answer to their own great tire problem! Never before have they known a genuine on-the-road and off-the-road tire—with new mastery of the most extreme mining conditions and demands.

NOW IT'S HERE—the Mid-Century Fleetmaster—with smooth, long-distance highway rolling, with spearhead depth traction to pull through slipperiest surface, up steepest grade.



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- ★ **From mine pit...**
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**TODAY'S SUPREME TRUCK TIRE WITH
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EXTREME PRESSURE

All production machinery will last longer — give better service — if the proper lubricant is used. That's why you will find it profitable to use high quality Tycol oils and greases in your plant.

There's a reason! No matter what your lubricating need — *EXTREME PRESSURE, high or low temperature, high speed or any other service condition — there's a Tycol oil or grease suited to your specific requirements.

Refined from the highest grade crudes, Tycol lubricants are exceptionally resistant to breakdown which means greater economy . . . longer machine life for every type of equipment.

Tide Water Associated will gladly recommend the Tycol lubricant that meets your particular requirements. Call, write or wire your nearest Tide Water Associated office today.



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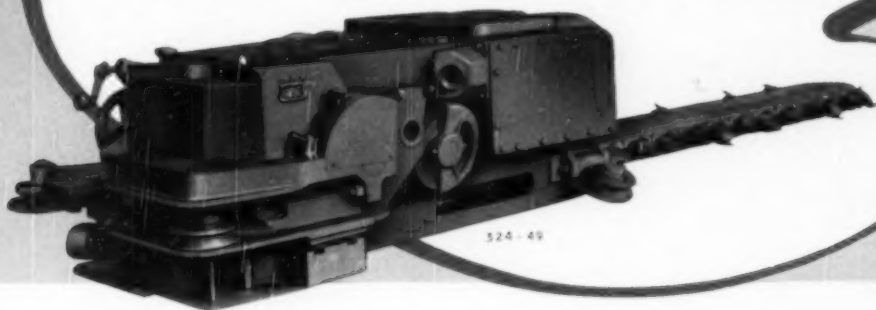


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This informative handbook, "Tide Water Associated Lubricania," gives clear, concise descriptions of the basic tests used to determine important properties of oils and greases. For your free copy, write to Tide Water Associated Oil Company, 17 Battery Place, New York 4, N. Y.

REFINERS AND MARKETERS OF VEEDOL — THE WORLD'S MOST FAMOUS MOTOR OIL

JEFFREY

35-B and 35-BB SHORTWALL CUTTERS

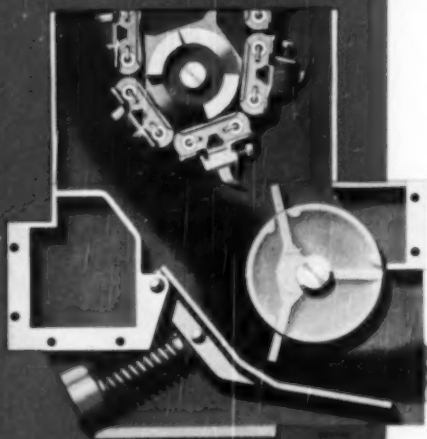


These machines include all the modern features essential to long life, rough usage and low cost operation. The records of thousands of Jeffrey SHORTWALL Cutters in constant year after year service give evidence of their sturdy construction and dependable low cost performance.

Movement of these machines is controlled by two wire rope drums, one a power

drum and the other a handling drum, are independently controlled. Having power on both drums provides easy, quick handling in any desired direction.

Coal Cutters to meet your needs . . . backed by an Engineering Staff, Experience and manufacturing facilities. Contact a Jeffrey Engineer for specific data on the unit best suited to your operation. In the meantime send for Catalog No. 829.



SLACK HANDLING DEVICE

With this unit the cuttings are automatically removed and stowed under the slack pile to the right and rear of the machine. No further cleaning is necessary before shooting. View at the left illustrates the simple working principle. Manganese steel paddles move the cuttings from the cutter chain to the rear corner of the machine where they are pushed out. A package unit . . . easily applied to machines in service.



JEFFREY SHORTWALL

WHEREVER COAL IS MINED YOU

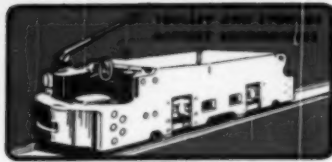
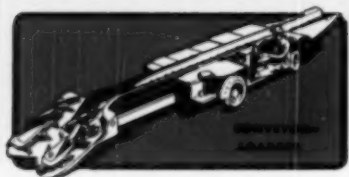
ALL CUTTING MACHINES



396-45

Here you see a Jeffrey SHORTWALL at work in a large mine. Chiefly responsible for the success of this type of coal cutter are these widely recognized features: Simplified operation . . . Rugged construction . . . Low maintenance . . . Accessibility . . . Permissible construction. There are four types to meet every system where SHORTWALLS are used, with top performance assured.

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JEFFREY

EQUIPMENT

FOR COAL MINES

THE JEFFREY MANUFACTURING COMPANY

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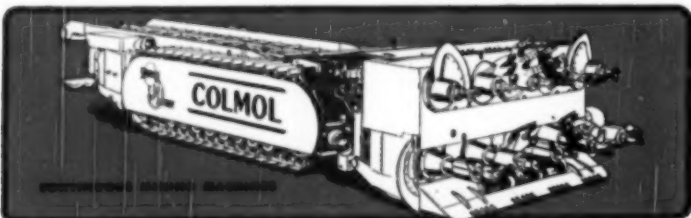
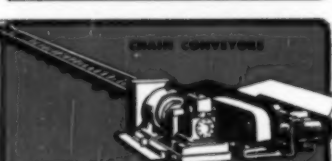
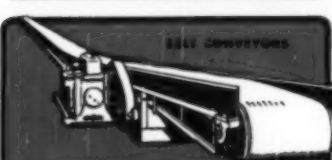
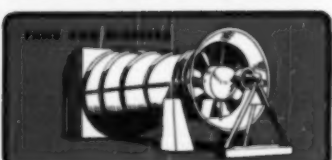
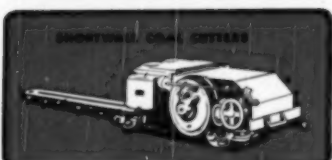
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It's knowledge of your machines and their exact lubrication needs. It's the *right* lubricant, applied the *right* way. It's engineering service that helps you create one unified lubrication program throughout your plant.

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Correct Lubrication

**WORLD'S GREATEST LUBRICATION KNOWLEDGE
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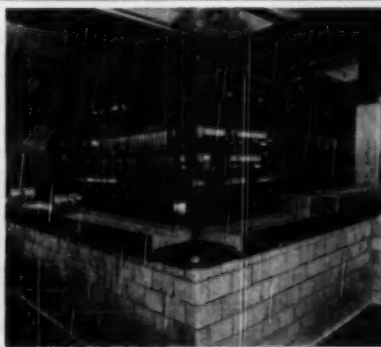
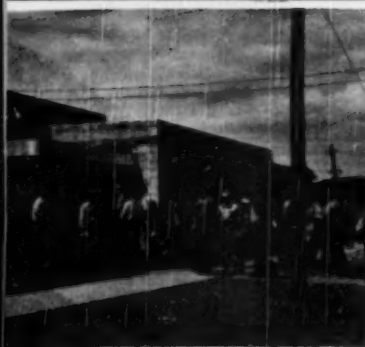


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ELECTRIC CAP LAMP

The sweeping acceptance of the EDISON Model R-4 Electric Cap Lamp extends from large to small operations throughout modern mining—wherever emphasis is heaviest on increasing production safely with the most advanced equipment!

• Combining a 4-cell Edison nickel-iron-alkaline battery with balanced headpiece providing long-range "spot" or brilliant flood of light, the new Model R-4 furnishes the maximum in effective light and long useful life. Minimum lamphouse handling is a prominent service feature. *Let us arrange a demonstration—and discussion for a more efficient lamphouse layout.*



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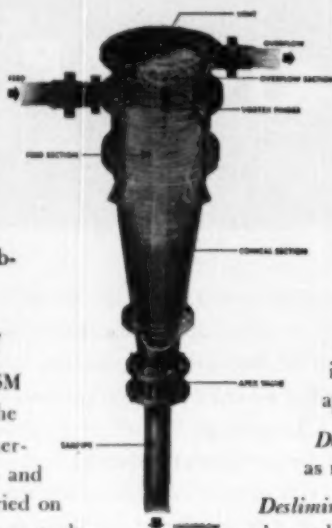
a new and proven tool in metallic and non-metallic minerals and chemical processing

the DORRCLONE[®]
(DUTCH STATE MINES CYCLONE)

The DorrClone is a compact cylindro-conical classification unit utilizing centrifugal force in place of gravity. It provides a new method of separating finely divided solids in liquid suspensions and constitutes an important new tool with which to supplement current established practices.

RESEARCH AND DEVELOPMENT

Development of the DorrClone (DSM Cyclone) was begun in 1939 by the Dutch State Mines in The Netherlands, where a continuing research and development program has been carried on since that time. The Dorr Company, as exclusive licensee under the Dutch State Mines patent rights in all fields other than that of heavy media separation, has been actively engaged since 1948 in development work relating to design variables affecting performance, materials of construction and possible fields of commercial use. The result of this program is a carefully engineered unit, capable of controlled and predictable operation.



PRESENT AVAILABILITY

DorrClones are now available singly or in multiple arrangements in four standard sizes: 3", 6", 12" and 24" diameters.

APPLICATIONS

Standard units are now limited to separations in the 20 micron to 100 mesh range but present studies indicate broader applications in the future. Typical commercial applications proven to date are:

Degritting of viscous suspensions such as milk of lime and clay slurries.

Desliming of metallurgical pulps, phosphate rock, coal, iron ore and tailings for mine backfill, with the production of extremely dense underflows where such are desired.

Classification of crystalline and other granular suspensions.

PATENTS

The DorrClone is covered by patents issued and pending in the United States and other countries.

Further information... We welcome inquiries on specific problems and applications and are prepared to undertake engineering investigations within the scope of our present knowledge and experience.

*DorrClone is a Trademark of The Dorr Company

DORR
RESEARCH — ENGINEERING — EQUIPMENT

DORRCLONE

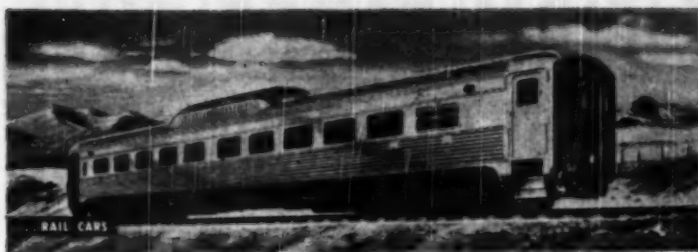
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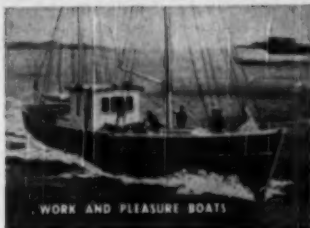
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Dorr Technical Services and Equipment Are Also Available Through Associated Companies and Representatives in the Principal Cities of the World, Names and Addresses on Request.



This is the Diesel

that speeds the big jobs



HERE IT IS—the newest member of the General Motors Diesel family—the brawny 6-110 engine that develops 275 horsepower.

It is 50% more powerful than the famous 6-cylinder GM "71" engine that powers so many trucks, buses, boats, construction equipment and other mobile, portable and stationary units.

This rugged new Diesel doesn't care what's tied to its tail. It has power to spare to keep big jobs humming, yet is so compact it doesn't hog space.

For example, each new Budd RDC rail car is driven by a pair of 6-110 Diesels with GM torque converter transmissions. The compactness of these power plants permits mounting them under the floor so that no revenue space is lost. These rail cars accelerate from standstill to 44 miles

per hour in just one minute and have a top speed of 83 mph with a full load.

Like all other GM Diesel engines the 6-110 is two-cycle—delivers power on every piston downstroke. This advanced design cuts down Diesel size without sacrificing ruggedness; it insures fuel economy, lower maintenance costs, exceptional dependability and long life.

The GM 6-110 engine provides Diesel power at its best for heavy-duty jobs—not only for rail cars but in the largest mountain-type trucks, huge rock crushers, deep-sea fishing and pleasure boats, big pumps and compressors, mining and oil field equipment. *It is an exceptionally compact Diesel for its horsepower—an engine that gives remarkably fine performance in minimum space.*

DETROIT DIESEL ENGINE DIVISION

SINGLE ENGINES... Up to 275 H. P. **DETROIT 28, MICHIGAN** MULTIPLE UNITS... Up to 800 H. P.
GENERAL MOTORS

Hear HENRY J. TAYLOR on the air every Monday evening over the ABC Network, coast to coast.

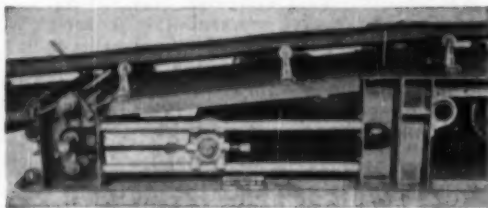
*Only GM Diesels provide
all these advantages*

Compact size—less weight per horsepower • Two-cycle smoothness, power on every downstroke • Quick starting, on its own fuel • Unit injectors—no high-pressure fuel lines • Rapid acceleration • Cleaner burning • Better high-altitude performance • Easy accessibility.



"Your Key to Power Economy"

ONLY ONE FIRM TAKES FULL MINE CONVEYOR PERFORMANCE



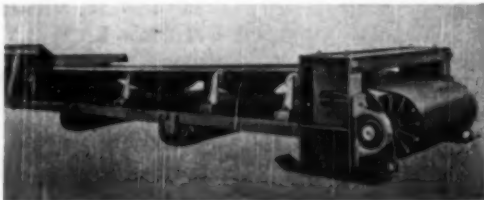
TAIL SECTION

Telescopic type to provide tail takeup action. Easy to clean out—no steel work under tail pulley. Has transverse cover to protect pulley, bearings and belt. Strong enough so you can rest a feeder on it.



INTERNAL TAKEUP

Located directly back of the drive. Handles 10' of belt slack. Operated by reversible ratchet-wrench working on gear reduction to minimize manual effort. Double-acting pawl prevents backing-up. Worked from either side of conveyor.



RESPONSIBILITY FOR COMPLETE

... only HEWITT-ROBINS makes and guarantees both machinery and belt

No longer need you worry about your Mine Conveyor operation—wondering who will be responsible for the successful, *lasting* performance of its machinery *and* belt.

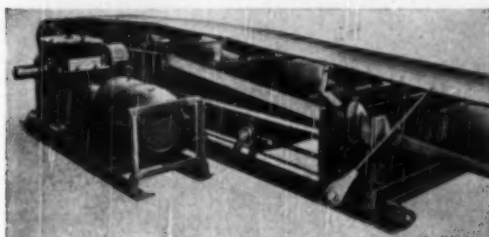
Get your Mine Conveyor from Hewitt-Robins. Here is a company—the only company in all the world—able *and* willing to take complete *unified* responsibility for the installation. For only Hewitt-Robins makes both machinery *and* belt.

The machinery is the sturdy, strong, substantial construction made by the Robins Conveyors Division and installed in all the better mines. The belt is the long-wearing Ajax® Underground Belt—with mildew inhibitors and acid neutralizers compounded in its wear-resisting rubber covers and high tensile fabrics in its enduring carcass—made by the Hewitt Rubber Division.

Yes, when you buy a Hewitt-Robins Mine Conveyor you get not only the best elements

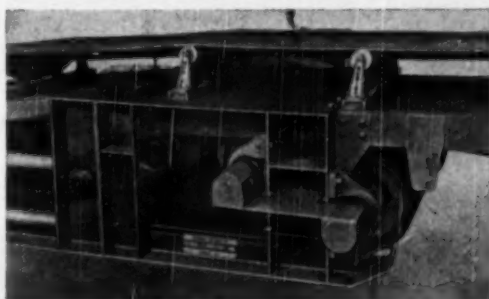
—machinery and belt—that your money can buy; you also get the satisfaction and peace of mind that come from having one unified source guaranteeing successful performance.

Hewitt-Robins Mine Conveyors can be shipped complete—machinery, belt, motors, reducers and drives—out of stock from Passaic, N. J., and Charleston, W. Va., in belt widths 26", 30" and 36", any desired length. For immediate delivery, get in touch with Hewitt-Robins, Inc., 1010 Pennsylvania Ave., Charleston, W. Va., or 270 Passaic Ave., Passaic, N. J.



UNIFIED DRIVE SECTION

Motor, reducer and controls mounted on a single base—skid-designed for easy moving about. Can be located on either side of the conveyor. Drive reversible—incoming for men and material, outgoing for high output of product.



SINGLE OR TANDEM DRIVE

Hewitt-Robins Mine Conveyors come equipped with both single and tandem pulley drive elements. Provide ample horsepower for lift and length up to the very limits of belt capacity. Reeving of belt handles level, uphill or downhill service requirements.

HEWITT-ROBINS
MINE CONVEYORS

HEWITT-ROBINS INCORPORATED

BELT CONVEYORS (belting and machinery) • BELT AND BUCKET ELEVATORS • CAR SHAKEOUTS • DEWATERIZERS • FEEDERS • FOAM RUBBER PRODUCTS • FOUNDRY SHAKEOUTS • INDUSTRIAL HOSE • MINE CONVEYORS • MOLDED RUBBER GOODS • RUBBERLOK® ROTARY WIRE BRUSHES • SCREEN CLOTH • SKIP HOISTS • STACKERS • TRANSMISSION BELTING • VIBRATING CONVEYORS, FEEDERS AND SCREENS

THE NEW INTERNATIONAL LOADSTAR

is built for a long, hard future

Model for model, Loadstars are the most rugged of all the rugged trucks in the International L-Line.

There's a special reason why this is so. Right from the drawing board stage, Loadstar models are specialized for work on assignments that give trucks a real beating.

You get a truck built for rough work

It's no wonder Loadstars thrive on hard knocks. Inverted "L" type frame reinforcements, heavier rear springs, and oversize rear axles are among the "geared for punishment" features that make them more than a match for the toughest jobs. Here is heavy-duty engineered ruggedness at its rugged best.

You get extra savings

Just wait till you find out how much lower operating and maintenance costs can be when you have a Loadstar. You get the kind of savings that have kept Internationals first in heavy-duty truck sales for 18 straight years.

You get new ease of handling

You get in and out of tight spots with ease. Shorter wheelbases, new wider-tread axles, and steering improvements galore assure you easy turns in the shortest practical circles.

You get a cab-full of comfort!

Tough jobs aren't quite as tough for the man behind the wheel of a Loadstar. He rides in the Comfo-Vision Cab—"roomiest on the road"—gets full front visibility through a one-piece, curved Sweep-sight windshield... enjoys more positive control from a more comfortable position.

There's a Loadstar model just right for your job

Get complete information from your nearest International Truck Dealer or Branch.

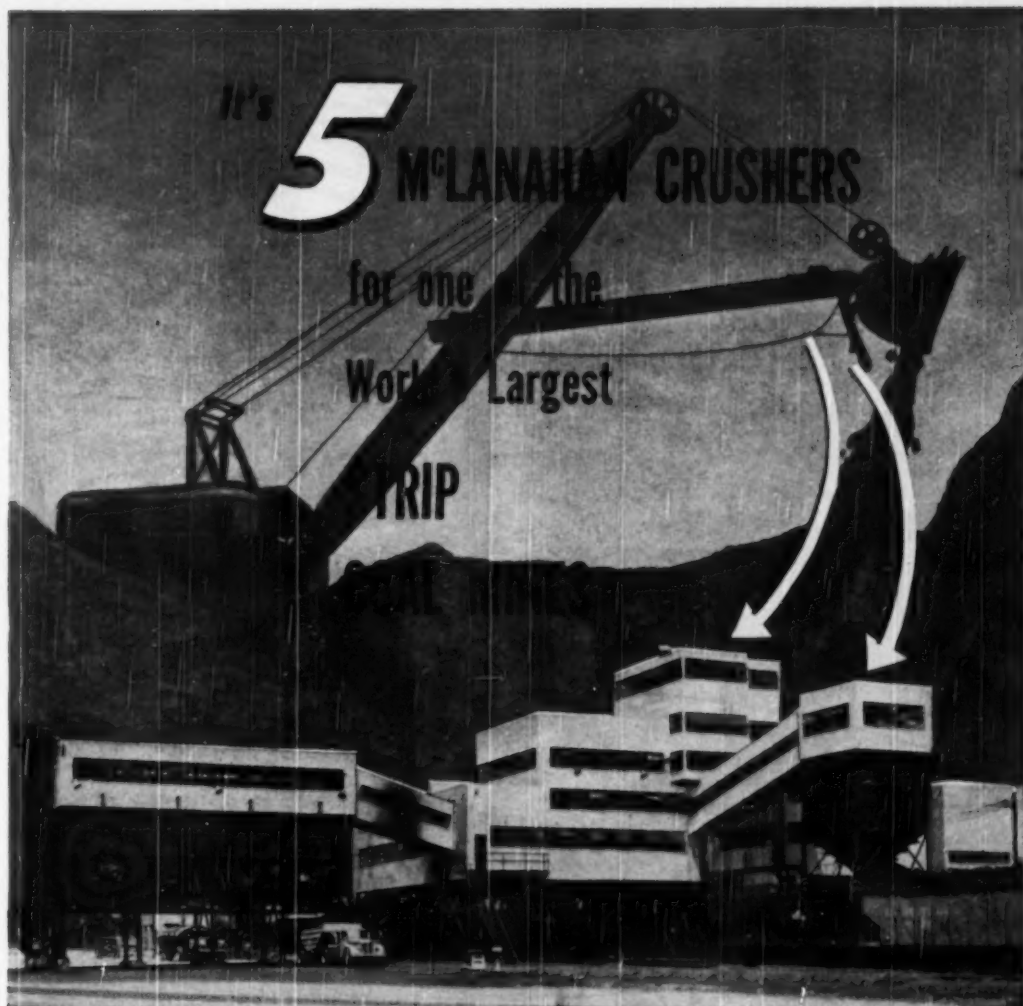
International Harvester Builds
McCormick Farm Equipment and Farmall Tractors
Motor Trucks... Industrial Power
Refrigerators and Freezers



Heavy-Duty Engineered

INTERNATIONAL TRUCKS

INTERNATIONAL HARVESTER COMPANY CHICAGO



THE THINGS WE BUILD . . .

- Heavy Duty Rock Crushers—Automatic Steelstrut Toggle, Quick Adjustment and Pioneer series • Light Duty Single Rolls—Black Diamond and Bantam Buster in steel, semi-steel or fabricated frames • Double Roll Fabricated Steel Crushers • Jaw Crushers • Portable and Semi-Portable Crushing Plants • Dry Pans Super Heavy Duty • Conveyors • Dryers of Revolving Type • Elevators • Hoists • Sand Drags • Log Washers & Scrubbers • Special Machinery and Complete Plants • Feeders • Ore Jigs • Screens

Yes—just like all other major modernization or new operation—McLANAHAN Equipment "goes on the job!" Sunnyhill Coal Company in its smart, modern, efficient new operation has 5 McLANAHAN Crushers "on the job." Write for complete information and bulletins on any of the products we build, as listed on the left, or for any specific modernization equipment you need.

Headquarters for Pit, Mine and Quarry Modernization

McLANAHAN & STONE Corp.

HOLLIDAYSBURG, PA.

Since 1835



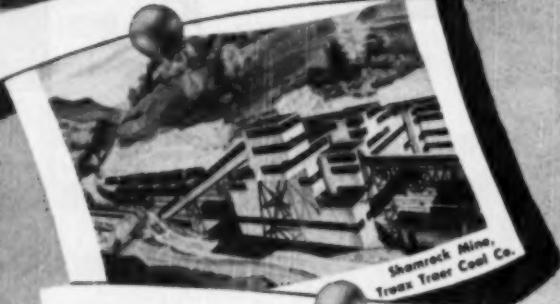
Hermattan Coal Preparation Plant



Snow Hill Coal Corporation



Caney Creek Mining Company, Inc.



Shamrock Mine,
Traxx Tracer Coal Co.



Tecumseh Coal Corp.

COAL PREPARATION PLANTS

Models of Architectural Design

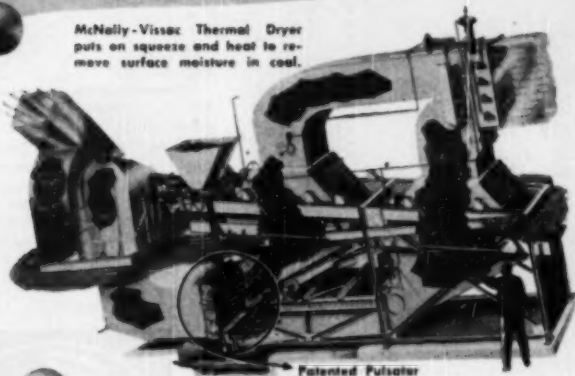
McNally-built plants are characterized by structural simplicity. Under flat-top set-back roofs, are compact cubicles daylighted by continuous sash. Expert plant layout provides labor-saving arrangements of equipment. Designs adapted to individual needs have one objective: recovery of the greatest tonnage of premium fuel with minimum effort and expense.

McNALLY PITTSBURG

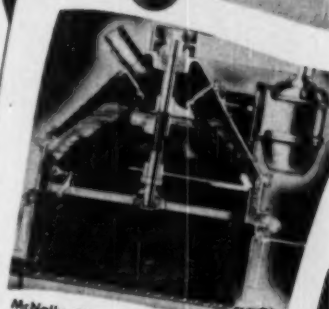
MANUFACTURERS OF EQUIPMENT TO MAKE COAL A BETTER FUEL

McNally Pittsburg Manufacturing Corporation — Manufacturing Plants: Pittsburg, Kansas • Wellston, Ohio
Engineering & Sales Offices: Pittsburg, Kan. • Chicago (11), Ill. • Pittsburgh (22), Penna. • Wellston, Ohio • Caixa Postal 1310, Rio de Janeiro, Brazil

McNally-Vissac Thermal Dryer
puts on squeeze and heat to re-
move surface moisture in coal.



Patented Pulsator



McNally-Carpenter Centrifugal Dryer
high water removal. Low operating cost.

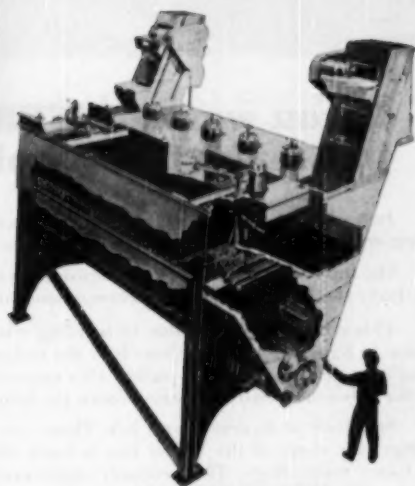


Gears Run in Oil

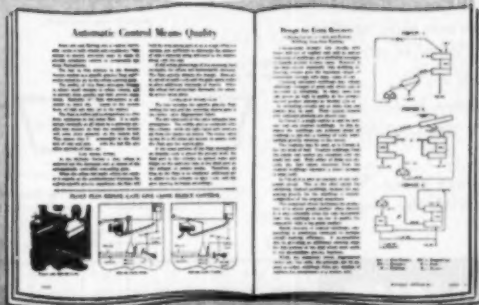
New Gearmatic Stoker
Coal Crusher. An all-
gear, totally enclosed,
self-lubricating drive.

BUT...

A COAL PREPARATION PLANT
IS NO BETTER THAN
THE SUM TOTAL
OF ITS COMBINED PARTS

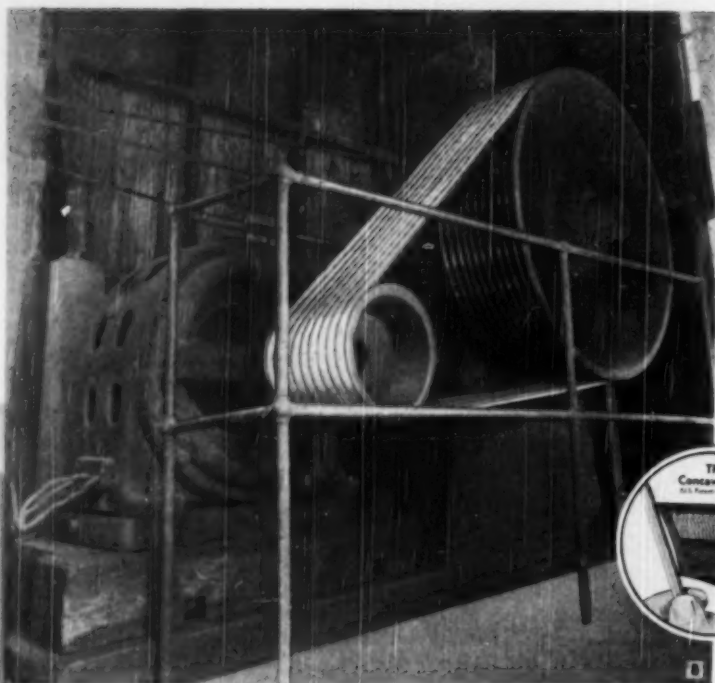


The McNally-Norton Wash-
er handles heavy tonnages
of 8" to 0. Clean-cut sepa-
ration of coal from refuse.



**"Turning Your Coal Into Gold
with an Efficient Cleaning System"**

Send for your copy of this amply
illustrated booklet, today. It's
packed with interesting informa-
tion about upgrading coal into the
premium-price class.



In many smelters, poisonous fumes from the "sintering" of ore must be drawn through a precipitation machine by a large fan. Should this fan fail, the plant has to be shut down at once. The photo shows how a Utah smelter has safeguarded itself against this possibility by installing a multiple V-Belt Drive on this important fan. The original ropes on the drive are still good after operating 16 hours daily for 12 years.



If you want LOWER V-BELT COSTS, just make this simple test!

Just pick up any V-Belt and bend it—exactly as it bends when going around its pulley—and *see what happens!*

The top of the belt is put under tension; hence it grows narrower. The body the belt is under compression and *bulges out*.

This change of shape, due to bending a *straight-sided* V-Belt, is shown in figures 1 and 1-A. Note how the bulging sides are forced to press *unevenly* against the V-pulley. This naturally causes uneven wear on the sides—*concentrated wear* where the bulge is greatest.

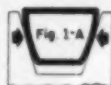
Now look at figures 2 and 2-A. There you see how the bending changes the shape of the V-Belt that is built with the Concave Side—the Gates Vulco Rope. The precisely engineered concave side of this belt merely *fill out* and become perfectly straight. There is no side-bulge. This belt, when bent, *precisely fits its sheave groove*.

Because there is *no bulging*, the sides of the Gates Vulco Rope always press *evenly* against the V-pulley and therefore wear *uniformly*—resulting in *longer belt life* and *lower belt costs* for you.

Only V-Belts made by Gates are built with concave sides. Whenever you buy V-Belts, be sure that you get the V-Belt with the Concave Sides—The Gates Vulco Rope!

What Happens When a V-Belt Bends

Straight-Sided V-Belt



How Straight-Sided V-Belt Bulges in Sheave-Groove. Sides Press Unevenly Against V-Pulley Causing Extra Wear at Point Shown by Arrows.

Gates Vulco Rope with Concave Side



The Concave Side Fills Out to a Precise Fit in the Sheave Groove. No Side Bulge! Sides Press Evenly Against the V-Pulley—Uniform Wear—Longer Life!

CS-5011

GATES VULCO ROPE DRIVES
IN ALL INDUSTRIAL CENTERS

Engineering Offices
and Jobber Stocks

of the U.S. and 71
Foreign Countries

THE GATES RUBBER COMPANY
DENVER, U.S.A.

The World's Largest Makers of V-Belts



For Surface Mines...



...For Underground Mines



...A SAFE, DEPENDABLE CABLE

FOR SIGNAL AND CONTROL CIRCUITS.

In open air or underground, Simplex - ANHYDREX Signal and Control Cables have what it takes to provide safe, trouble-free service under all operating conditions.

Anhydrex SA insulated and neoprene jacketed, they provide:

Excellent Electrical Properties

- High dielectric strength
- Low power factor
- Low dielectric constant

Protection Against Operating Hazards

- Water and moisture
- Grease and oils
- Heat and sunlight
- Bad weather
- Rough handling

Safe Operation

- Anhydrex SA insulation has stable electrical properties and is physically durable to withstand rigorous service. The neoprene jacket is especially tough and it will not support combustion.

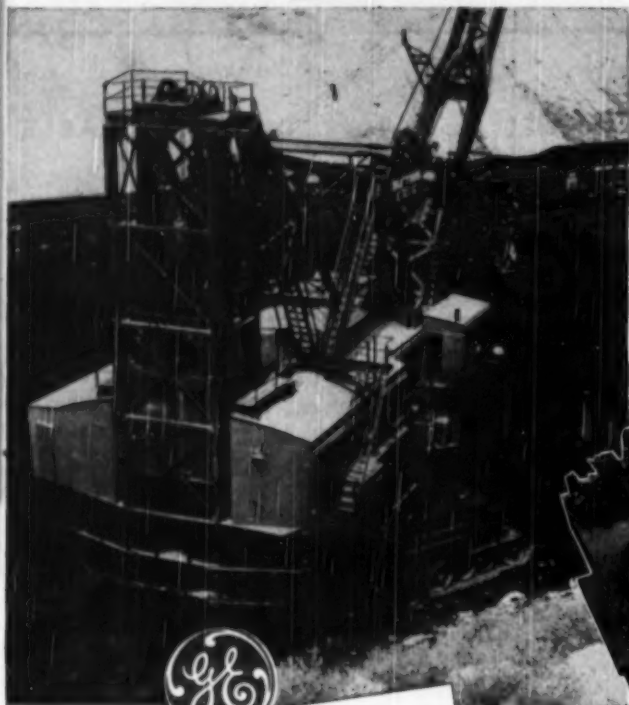
Simplex-ANHYDREX Signal and Control Cables have no metallic coverings to crystallize and corrode; are not harmed by vibration and stray currents. They are flexible, lightweight, and small in diameter; easy to install, splice, and terminate.

SIMPLEX-ANHYDREX

SIMPLEX WIRE & CABLE CO., 79 SIDNEY ST., CAMBRIDGE 39, MASS.

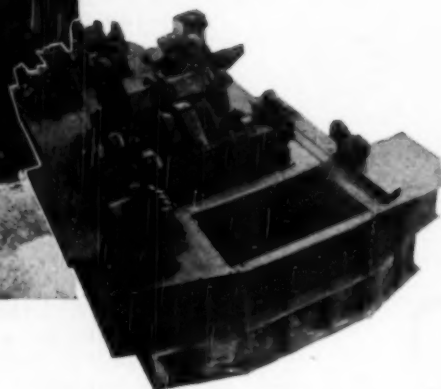
WRITE FOR CATALOG 1013

Loads 30 tons a minute —electrically!

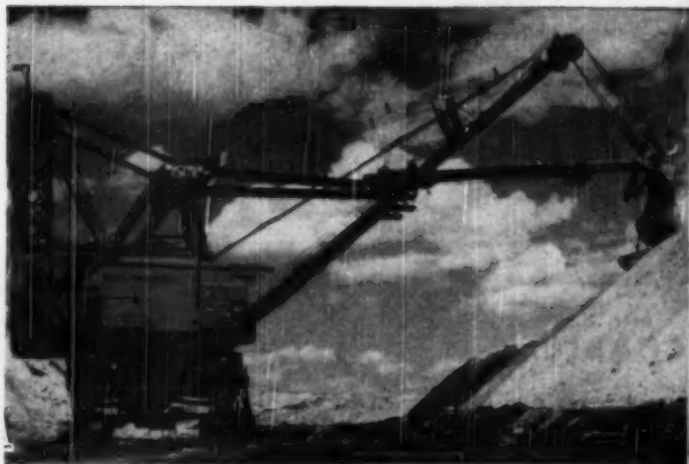


**AMPLIDYNE-CONTROLLED
SHOVEL DRIVES**
... to cut mining costs!

1 With a 17-yard dipper and an 85-foot boom length, this new loader needs only five passes, averaging 35 seconds each, to load a standard 75-ton coal car! Thanks to G-E amplidyne control of hoist, swing, and crowd motions, the operator gets instant-acting response from the huge shovel, plus fast acceleration and deceleration that cuts cycle time to a minimum. With main drive completely G-E equipped, this world's largest coal loader contains motors totalling some 2000 horsepower.



2 Muscle power for the loader—shown in this view of machinery deck during assembly—includes two 187½-hp hoist motors (foreground), two 75-hp vertical swing motors, and a 75-hp crowd motor (background). G-E MD series motors—the toughest G-E shovel motors ever built—permit handling heavier loads safely at higher maximum speeds, provide more hp per frame size, require less inspection and maintenance.



World's largest loading shovel—together with giant stripper—relies on G-E equipment to help maintain average output of 100 tons of coal per man per day at Foley Bros. Inc. operation near Colstrip, Montana!

3 This mammoth strip shovel—the loader's teammate and also electrically equipped throughout by General Electric—can pick up a load of overburden with its 20-yard dipper and drop it 300 feet away! In addition to amplidyne control of all motions, it utilizes a G-E amplidyne power-factor regulator that substantially reduces voltage variation, permits more efficient operation of the equipment.



4 Hoist, swing, and crowd motors in the stripper are precisely governed by its G-E amplidyne control, shown mounted atop G-E motor-control cabinet inside the shovel house, with G-E switchgear at left. Small and compact, it uses fewer control devices, takes up minimum space, protects equipment against excessive current and torque peaks.



5 Incoming a-c power, protected against outages by neutral grounding, is converted to d-c by this 7-unit motor-generator set. Neutral grounding assures maximum protection for operating personnel and minimum equipment shut-downs in case of any line-to-ground fault. On large shovels of this type, designed to pay off by continuity of operation and high output, this is an especially important factor.



6 These two G-E 250-hp hoist motors, as well as the stripper's other motors, are of extra-tough construction for extra-heavy duty. They feature removable top portion for easy inspection and maintenance—right on the shovel—without disturbing motor alignment. Removal of external connections and four bolts provides easy access to armature and brush holders.



7 Like the stripper's hoist and crowd motors this G-E 125-hp vertical swing motor, one of two, is built for extra-tough jobs. Literally thousands of shovels and draglines have been electrified by G. E. to boost output, cut costs. This experience is at your service when you call in a G-E mining specialist, or specify G-E shovel equipment. Send for Bulletin GEA-4843, "More Yards Per Day." Apparatus Department, General Electric Company, Schenectady 5, New York.

GENERAL  ELECTRIC

009-21

Aeroquip

FLEXIBLE HOSE LINES

WITH DETACHABLE,
REUSABLE FITTINGS



- PREVENT LEAKAGE
- ARE RESISTANT TO FIRE
- HELP REDUCE OPERATING COSTS
- ELIMINATE FAILURES DUE TO VIBRATION
- OPERATE AT -40° TO $+275^{\circ}$ F. TEMPERATURES
- FOR USE WITH HYDRAULIC FLUIDS, WATER, FUEL, LUBRICATING OILS AND MANY OTHER FLUIDS

Aeroquip for better performance, maintenance and service



Dealers and Distributors Wanted

AEROQUIP CORPORATION

JACKSON, MICHIGAN

SALES OFFICES
AND WAREHOUSES:

1051 NO. HOLLYWOOD WAY, BURBANK, CALIF.
2912 N. E. 28TH ST., FORT WORTH 11, TEXAS
4301 N. W. 36TH ST., MIAMI SPRINGS, FLORIDA

SALES OFFICES:

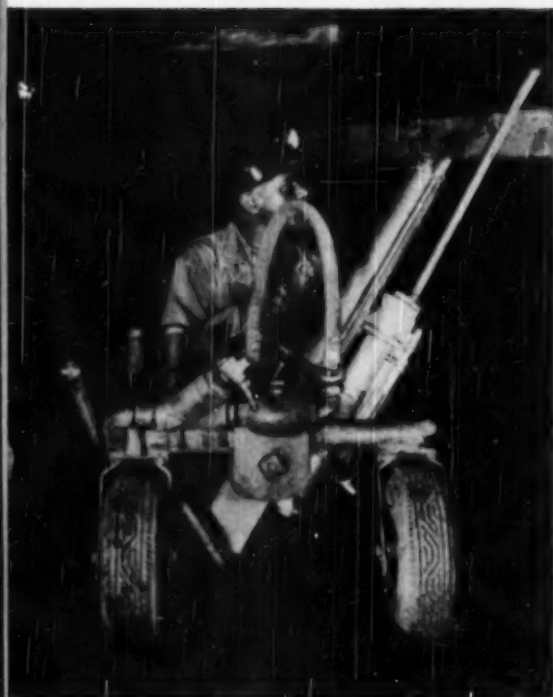
203 WAREHAM BLDG., HAGERSTOWN, MD.

1215 SO. EAST GRAND AVE., PORTLAND 14, ORE.
P. O. BOX 1586, HIGH POINT, NORTH CAROLINA
72-74 STAFFORD STREET, TORONTO, CANADA

EDINA BRANCH—BOX NO. 44, MINNEAPOLIS 10, MINN.

AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U. S. A. AND ABROAD

One man can drill
50% MORE HOLES
in less time and with
far less effort—with



the **NEW**
JOY
**RUBBER TIRE-MOUNTED
ROOF-BOLTING DRILL**

★ Highly Mobile and Flexible.

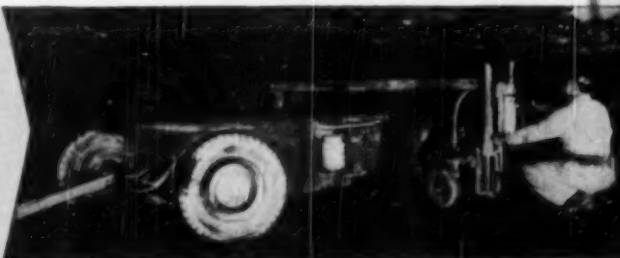
★ Greater stability ... and the one
JOY Drill does your entire Roof
Bolting job—drills the hole, drives
the bolt and tightens the nut.

JOY Roof-Bolting Drills and Mine-Air Compressors—available in a complete range of types and sizes to meet any requirement—are backed by more than 50 years of drill and compressor-building experience.

The other half of your Roof-Bolting Team

JOY MINE-AIR
COMPRESSORS

Compact • Mobile • Highly Efficient



Write for Bulletins, or

Consult a Joy Engineer

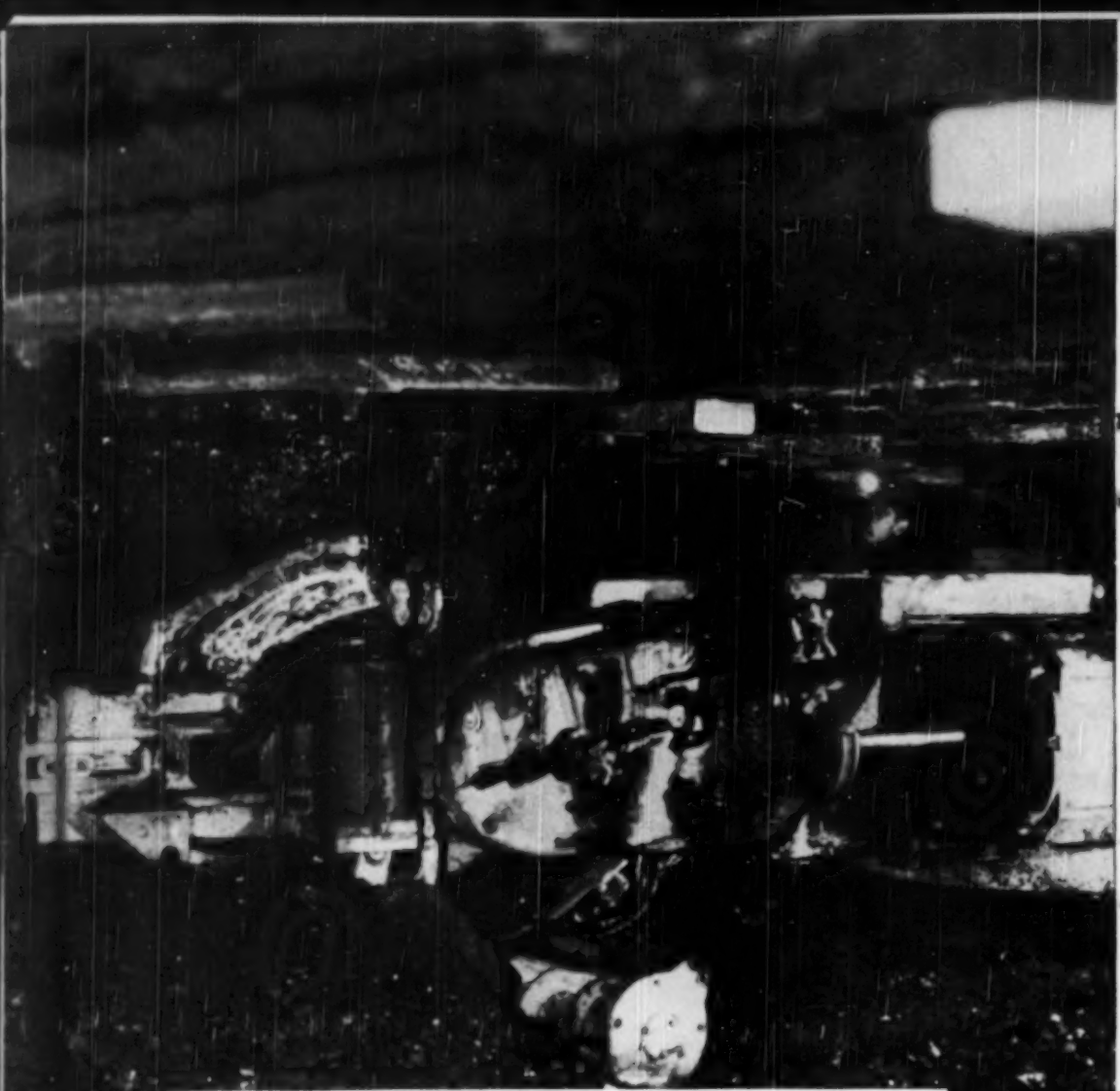


WBD CL 2554

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

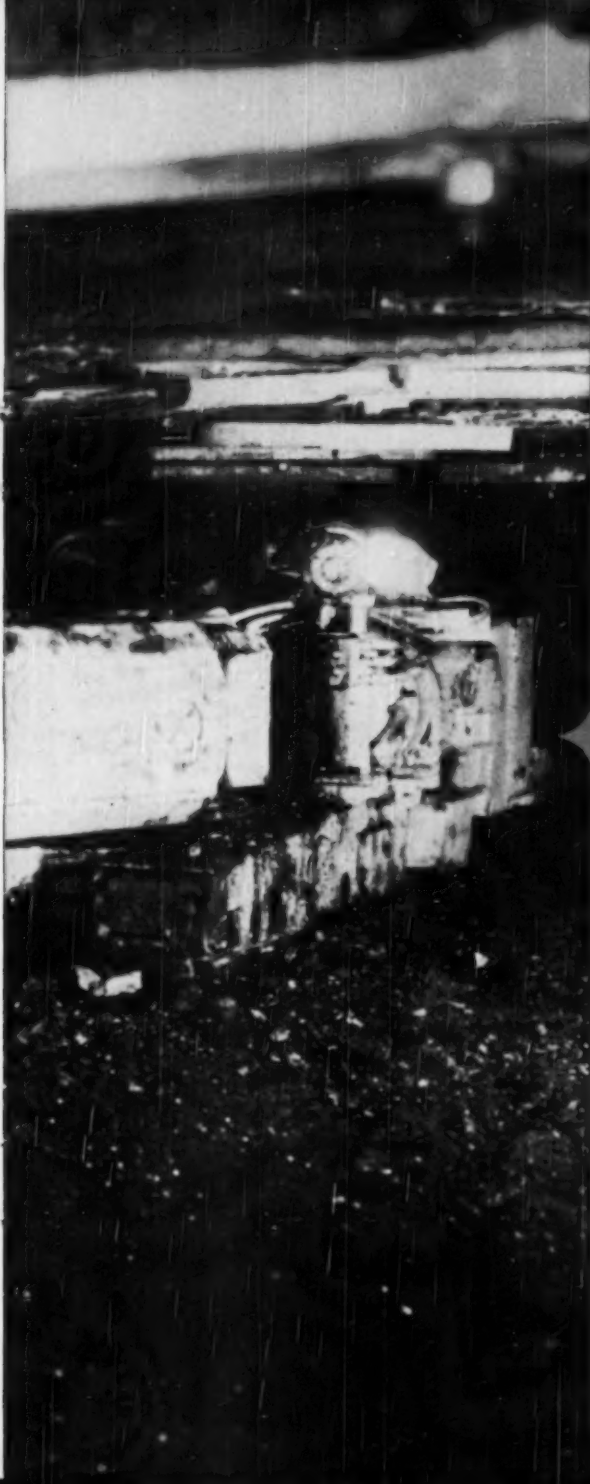
IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO



HERE'S A TYPICAL MONTH'S PERFORMANCE
OF THE JOY CONTINUOUS MINER PICTURED ABOVE

	Day Shift	Night Shift
<i>Number of Working Days</i>	22	22
<i>Length of Shifts: Hours</i>	7:00	7:00
<i>Average Machine Operating Time: Hours</i>	4:38	5:07
<i>Average Feet Advanced per Day</i>	105	122.7
<i>Average Production: Tons per Man Day</i>	42.4	50.3
<i>Average Cost per Ton (Labor: 7-man Crew)</i>	\$.34	\$.29

This machine is a 3JCM Continuous Miner, the Joy low-vein Model. It is working in 55" coal which has a 2" parting in the middle of the seam. The machine is charged with a 7-man crew on each shift, which includes the operators of all mechanical equipment, as well as a boom man who shifts cars under the belt conveyor, and a roof-bolting man.



In thin seams
or in
thick seams

The **JOY**
**CONTINUOUS
MINER**

marks a new era
of Efficiency
and Low Cost
in coal mining

*Consult a
Joy Engineer*

W.D. 81.5500



JOY MANUFACTURING COMPANY

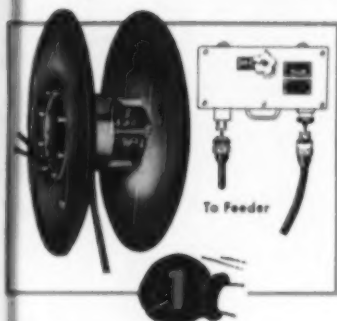
GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

IN CANADA: JOY MANUFACTURING COMPANY (CANADA) LIMITED, GALT, ONTARIO

JOY

can **KNOCK-OUT**

YOUR TRAILING CABLE REPAIR DIFFICULTIES



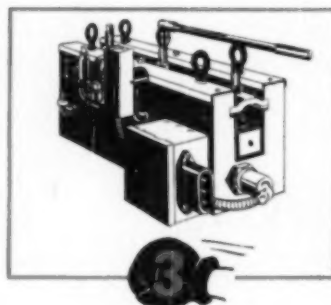
**SECTIONALIZE WITH
PORTABLE CONNECTORS**

The *first* step in JOY's proved 3-step plan is to eliminate *temporary* cable repair. On-the-job repairs lose too much valuable machine time, and are safety hazards at best. With "Mines" at-the-reel Connector Assemblies, you can sectionalize cable in easily handled lengths all the way from power source to machine. Damaged lengths can then be easily and quickly replaced with perfect spares—and all trouble-shooting, splicing and rejacketing operations centralized *in the shop*, for best work at the least cost.



**USE THE CABLE
FAULT-FINDER**

The *second* step is to provide for quick and accurate location of trouble without further damage to the cable, with the new "Mines" Cable Fault-Finder. This revolutionary unit is a light, compact, self-contained, battery-operated detector. Operation is similar to the wartime mine-detector—can be handled by anyone, with no special training required. Not usable on shielded cable, but immediately locates solid shorts, high-resistant shorts of 5000 ohms or less, and open circuits in rubber or neoprene-jacketed cable.



**VULCANIZE ALL
CABLE REPAIRS**

Third and final step in the JOY plan: install shop equipment for immediate, professional-type repairs to insulation and jacketing that will make damaged cable good as new. This job calls for *hot vulcanization*, not dangerous cold-taped splices. "Mines" Vulcanizers are available in five sizes, with mold designs and the necessary materials to cover all standard mining cable requirements. No special skill is needed to make perfect, watertight repairs, equalling the original cable's safety, wear-resistance and performance.

Consult a Joy Engineer for complete details and prices



MINES EQUIPMENT  **Division**

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH 22, PA.

First Choice

FOR AUGERING WITH AIR!

Thor PERCUSSION TYPE COAL DRILLS



No. 28

30 LB. SINKER

Ideal tool for light to medium drilling. Can be equipped with auger rotation.



No. 129

35 LB. AUGER

Auger rotation on power stroke. Famous for trouble free operation, air economy.



No. 35

35 LB. SINKER

Endless wear from operating parts. Exclusive valve design gives extra power, efficiency.



No. 39

45 LB. AUGER

Powerful rotation prevents stalling even in heavy, sticky formations.

ROTARY TYPE



Coal Auger
Capacity: 2"

Available in speeds 700 to 450 R.P.M., reversible or non-reversible. Equipped with full size steel protection plate, U.S. approved chuck.

POWERFUL... ECONOMICAL... SAFE!

Designed particularly for blast hole drilling in coal mines, these Thor PERCUSSION TYPE and ROTARY TYPE pneumatic coal drills meet every requirement for sure, safe, easily controlled power drilling. Exclusive heat treating process assures amazingly long life for operating parts. Easily operated forged steel retainers on percussion type tools; rotary type equipped with chuck developed to meet safety code of United States Bureau of Mines. For complete information and demonstrations, see your Thor distributor or write Independent Pneumatic Tool Co., Aurora Ill.

Percussion type drills available with offset handle for plank-mounted operation; rotary type utilizes flats of protection plate for same purpose.

Thor TOOLS

FOR MODERN MINES

EXTRA VALUE... **BIG**

EXTRA COST... **SMALL**

Form-Set (preformed) wire rope. For purposes of illustration, two strands have been lifted away from the core. Note that the lack of internal tension keeps wires from popping out of place.



Form-Set (preformed) rope has so many advantages over the non-preformed type . . . yet now costs so very little more.

When Bethlehem announced its reduced price differential between Form-Set rope and the non-preformed kind, it was expected that a great many wire-rope users would immediately change to Form-Set. They did—in such large numbers that even we were surprised.

Perhaps we shouldn't have been.

For the new price structure now puts Bethlehem preformed rope within the reach of all. At little more than the cost of non-preformed rope, you can now have the better spooling and easier handling that Form-Set makes possible; the greater resistance to bending fatigue, and in many cases increased rope life.

Form-Set is virtually free of internal tension. It's a "friendly" wire rope; that is, it's so easy to rig, and it glides so smoothly over sheaves and drums. And you'll find, too, that it doesn't kink readily; that's one of its best points.

In fact, it has so many good points that use alone can bring them all to your attention. We suggest that you try a reel if you haven't already done so. There's economy in every inch of Form-Set.

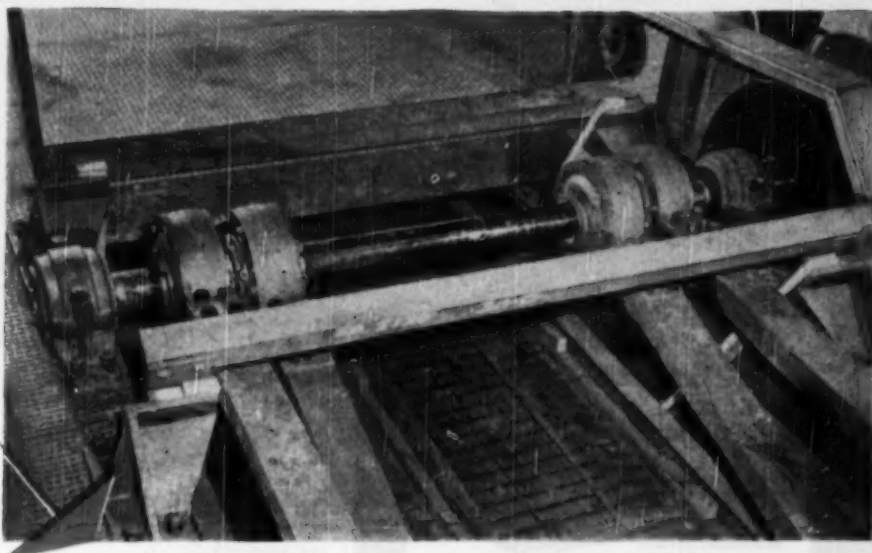
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. Export Distributor: Bethlehem Steel Export Corporation



When you think **WIRE ROPE . . . think BETHLEHEM**

Here's the ANSWER to your shaker screen lubrication problems



GULF CAM GREASE

Is lubrication of shaker screen eccentrics or cams a problem in your mine—hot eccentric strap bearings, excessive oil leakage, grease separation, or lubricant washout? The practical answer—Gulf Cam Grease! Specially prepared to relieve conditions like these, it provides proper lubrication for eccentrics and cams in breakers and preparation plants under most operating conditions.

Because it has a high dropping point, Gulf Cam Grease is readily retained in eccentric strap bearings—does not leak out even at the high temperatures encountered in severe service. Thus it is superior to oil for this application—oil may have a tendency to leak out from the bearings, leaving them unprotected, and creating an accident hazard.

Just as important is the fact that Gulf Cam Grease is exceptionally stable at these high temperatures—does not separate nor oxidize appreciably. Unlike most high-temperature greases, Gulf Cam Grease is an effective lubricant where wet conditions prevail.

Gulf Cam Grease is recommended for the lubrication of all types of eccentric strap bearings. Its use will help

prevent overheating, and insure less wear and lower maintenance costs.

For further information on Gulf Cam Grease, and for expert help on other lubrication problems, call in a Gulf Lubrication Engineer today.



Gulf Oil Corporation • Gulf Refining Company

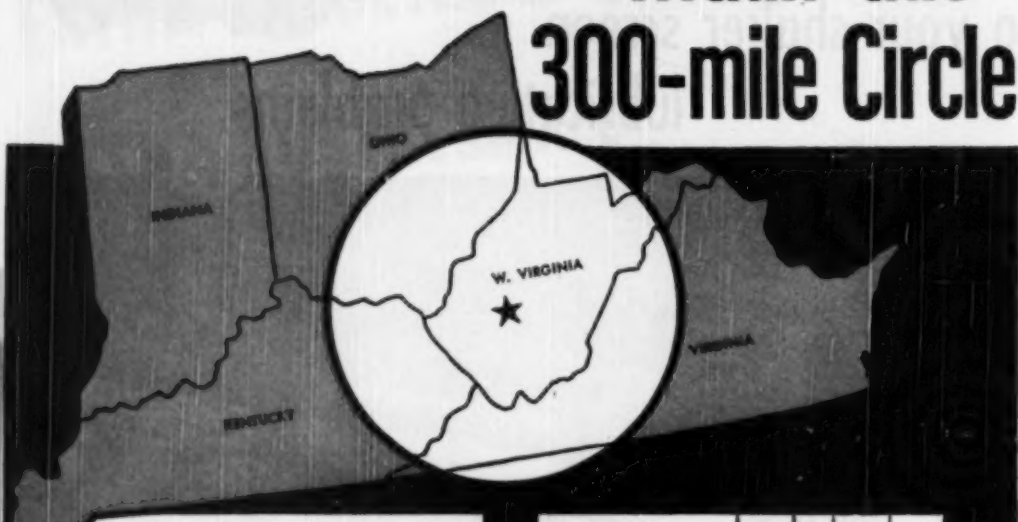
GULF BUILDING, PITTSBURGH, PA.

Sales Offices - Warehouses

Located in principal cities and towns throughout
Gulf's marketing territory

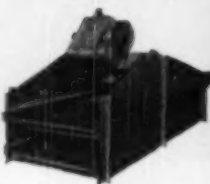
OVER 1000 ALLIS-CHALMERS VIBRATING SCREENS

within this 300-mile Circle



LOW-HEAD SCREEN

For draining, washing and dewatering following heavy media cells . . . for prewashing ahead of heavy media operations . . . for dewatering and sizing large size coal. Horizontal operation saves headroom, cuts installation costs. Send for Bulletin 07863308.



RIPL-FLO SCREEN

A high capacity inclined vibrating screen for sizing egg, nut, and stoker grade coal. Simple two-bearing mechanism results in low weight, maintenance and power requirements. Heavy-Duty Rip-Flo screens handle ROM coal and rock. Bulletin 0786151C.



AERO-VIBE SCREEN—a low-cost screen for small tonnages, makes separations 20 mesh to 1½ in. Bulletin 0786099.

PROOF THAT coal men prefer Allis-Chalmers vibrating screens—more than 1000 are on the job within a 150-mile radius of Charleston, W. Va., most of them in coal preparation plants. And there are thousands more in use elsewhere in the United States and throughout the world.

Coal men have found modern Allis-Chalmers vibrating screens a good bet for keeping tonnages up and costs down. In fact, many Allis-Chalmers screens have paid for themselves sever-

al times over in increased coal recovery . . . and reduced operating and maintenance costs.

Sturdy A-C screens are made of high tensile steels, with all-welded construction, "stress-relieved" to eliminate strains around welds. They're built for easy maintenance, too.

The A-C representative in your area can show you how Allis-Chalmers vibrating screens can add profit dollars to your operations. Call him, and write for Bulletin 25B6280A, covering all Allis-Chalmers equipment for coal.

A-3189
ALLIS-CHALMERS, 968A SO. 70 ST.
MILWAUKEE, WIS.

ALLIS-CHALMERS

Low-Head, Rip-Flo, Aero-Vibe and Texrope are Allis-Chalmers trademarks.

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Principal Cities in
the U. S. A. Distributors
Throughout the World.



Motors



Controls



Texrope Drives



Vibrating Screens



Crushers



Kilns, Coolers, Dryers





Thermoid Shuttle Belts Feed Tons of Coal to Surge Bins . . . Cut Conveying Costs !

Thermoid Belting is a consistent cost-cutter because it carries maximum tonnage, requires little maintenance, and stands up under plenty of punishment.

Whether the job is handling ore, coal or rock, Thermoid Conveyor Belts stay on the job—long after other belts fail. Fewer delays due to belt-breakage . . . belt-slippage . . . premature wear and tear.

Your Thermoid Distributor carries a complete stock to meet your requirements. Thermoid Field Representatives are available to help you select the right Thermoid Belting for your job. Broad experience in *all* fields of industry equip Thermoid Engineers to recommend the belt that can best perform the tasks you assign it in your daily operations.

For economy, strength, load-capacity, your belting dollars buy more potential operating profit with Thermoid.

It will pay you
to

Specify Thermoid

Thermoid Quality Products: Transmission Belting • F.H.P. and Multiple V-Belts • Conveyor Belting • Elevator Belting • Wrapped and Molded Hose • Molded Products • Industrial Brake Linings and Friction Materials.

**Thermoid
Company**

Main Offices and Factory • Trenton, N. J., U. S. A.

Western Offices and Factory • Nephi, Utah, U. S. A.

Industrial Rubber Products • Friction Materials • Oil Field Products



"OUR OBJECTIVE GENTLEMEN *is to Expand Our Markets*

... and the one sure way to reach such a goal is through engineering that plans for

1. *Highest possible quality*
2. *Greater tonnage*
3. *Lower production costs."*

The Allen & Garcia Company accepts such challenges by management and is ready, as in the past, to bring any progressive coal production plans to a realization.

Our services first begin with thorough consultation on every detail of your present or planned operations. Next is a complete study by our experts so that our report to you provides amply for the present and fully anticipates the future. Thus with fundamental engineering as a basis, each assignment is individually considered and A&G ingenuity goes to work.

Detailed engineering all the way through gives each mine a full measure of operating advantages—in added tonnage—in lower cost per ton production—in maintenance savings—in facilities and flexibility as tonnage increases and in safety.

Our "on the field" contacts, together with our services rendered to mining operations throughout the world have given A&G engineers a broad and valuable experience that can pay large dividends to you—whether your problem is the design of an entirely new mine or in the modernization of above and below ground facilities.

When you are ready, let us know and we will contact you.

SCOPE OF SERVICES

- Design and construction of new plants and their various units.
- Organization, operation, and management of mines.
- Below ground modernization and mechanization.
- Reconstruction, revamping, or improvement of existing plants.
- General consulting work regarding power, equipment, operation, and various mining problems.
- Valuations for financing, fire loss, taxation purpose—reports and appraisals.

We work with undivided responsibility to you at a fixed fee. We are not hampered by any connections which might prejudice the true professional engineering approach to your problems.

ALLEN & GARCIA COMPANY

CONSULTING AND CONSTRUCTING ENGINEERS

332 S. MICHIGAN AVE., CHICAGO 4, ILL. • 120 WALL ST., NEW YORK 5, N. Y.

NOW! Mine cable with

"COLD RUBBER"

This new Securityflex® is so resistant to injury — so dependable and long-lasting in the toughest kind of shuttle car service — that it surpasses the expectations of even our own cable engineers.

**what did we do
to improve this
already famous cable?**

We improved the insulation.

We improved the grounding wire.

We improved the conductor stranding.

We improved the jacket.

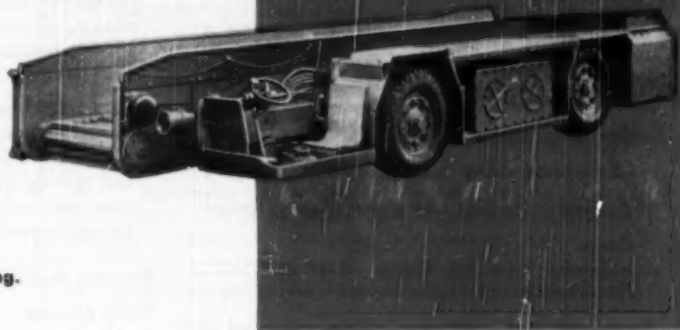
results—

More flexibility: greater resistance to breakage of conductors subjected to repeated short-radius bending.

Better insulation: much tougher and more resistant to moisture and cutting.

More resistant to: short circuits, abrasion, kinking, crushing, twisting, jerking.

**New Securityflex
Shuttle Car Cable
does a
tremendously
better job!**



Strong words? We'll make good every claim. Ask Anaconda's nearest Sales Office or Distributor for supporting data — and prove it for yourself. Anaconda Wire & Cable Company, 25 Broadway, New York 4, New York. ANW

*Reg. U. S. Pat. Off.

the right cable for the job ANACONDA®
WIRE AND CABLE

No Wasted Gases Spouting In This Shot!



1. Ready to go!



2. Rock moving out!



3. Rock falling down!

Machine-gun Camera Shows Blasting Control with **ROCKMASTER "16"** Blasting System

WE DIDN'T just "happen" to catch a picture of this blast at the right time! Actually, we got over 15 photos of this blast, using a special "machine-gun" camera. The photos here are spaced at $\frac{3}{5}$ second intervals. They give positive proof that the ROCKMASTER split-second delay blasting system can give the kind of *blasting control* that blasters dream about.

For example:

CONTROLLED Force—You pay for the energy of explosives gases. You want them to w-o-r-k on your burden—not be wasted in the air. There's not a sign of wasted gas in this shot, even when the rock has moved clear out and is ready to drop.

CONTROLLED Throw—Not a rock appears above the top of this 180-foot face. You get your rock in high or shallow piles, against the face or away from it—as you want it—with the ROCKMASTER system, because the system is adjustable to fit your requirements.

CONTROLLED Breakage—Rock ready for the shovel! You can see it without a doubt in photo No. 3. And if you're interested in stripping coal and getting bigger lump—ROCKMASTER can often help you do that, too—with substantial savings in your explosives costs.

For rock, coal, ore—on the surface or underground

Write for your copy of the ROCKMASTER "16" booklet showing how you can profit through use of the correct members of the series of 16-split-second delay electric blasting caps, with the ROCKMASTER system of explosives choice and loading methods. Our technicians will be glad to assist you in applying ROCKMASTER to your operations.

ROCKMASTER: Reg. U.S. Pat. Off.

ATLAS EXPLOSIVES

"Everything for Blasting"



ATLAS POWDER COMPANY, Wilmington 99, Del. • Offices in principal cities • Cable Address—Atpowco

12 to 50 tons per man per shift with *LOW INVESTMENT COST*



36-inch McCarthy Coal Recovery Drill
with Lump Drill Head
(Auger retriever and auger hoist not shown)

REPRESENTATIVES

Capitol Equipment Company, Inc.
1134 Market Street
Harrisburg, Penna.

Diamond Supply Company
Evansville, Indiana

A. T. Green Machinery Co.
Box 9538
Pittsburgh 23, Penna.

Mine and Contractors Supply Co.
930 Second Avenue
Birmingham, Alabama

Nixon Machinery Company
Carter at 12th Street
Chattanooga, Tenn.

O. Philipp & Company
(Export Agents)
19 Rector Street
New York 6, New York

Rish Equipment Company
Box 1280, Richmond, Va.
Box 353, Charleston 22, W. Va.
Clarksburg, W. Va.
Box 1369, Roanoke, Va.
Box 269, Bluefield, W. Va.

Union Supply Company
1401 Wazee Street
Denver 2, Colorado

W. W. Williams Company
835 Goodale Blvd.
Columbus 8, Ohio

R. A. Young & Son, Inc.
301 So. 10th Street
Fort Smith, Arkansas

• Many successful mine operators credit McCarthy Coal Drills with tremendous new savings in time and money.

Recent reports from the Coal Salvage Company show that, with a 36-inch auger, the powerful McCarthy unit, running almost maintenance free, delivers 130 tons of coal during each 7½-hour shift for an average daily rate of 32½ tons for each of the 4-man crew.

With a 24-inch auger and a 3-man crew, average daily output amounts to 55 tons or 18½ tons per man.

The versatile McCarthy Coal Drill has plenty of extra power for handling 12, 16, 20, 24, 30 and 36-inch diameter auger sections with a smooth, steady bore that penetrates to almost any depth.

McCarthy Coal Drills can be equipped with electric, gasoline or diesel motors for both deep mine and stripping operations.

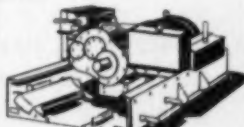
Write today for the full story on this remarkable new money-maker.



Lump Coal Recovery Drill Head



Coal Recovery in Highwall



Underground Coal Recovery Drill

THE SALEM TOOL COMPANY
101 SOUTH ELLSWORTH AVENUE
SALEM, MASSACHUSETTS





Choose from America's Greatest Truck Values!

CHEVROLET ADVANCE-DESIGN TRUCKS

You're right in every way when you choose Chevrolet trucks as your on-the-job partners. Chevrolet offers you more—in power for the job, economy of operation, low maintenance costs.

Economy-wise—you're right in choosing Chevrolet. You save money, for Chevrolet is the lowest priced line of all. And you save on gas, oil and upkeep with these trucks so famous for all-around economy.

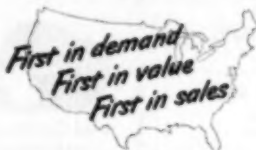
Power-wise—you get more with Chevrolet, too. Chevrolet's great valve-in-head engine is the result of 38 years of steady improvement—an engine that offers outstanding pulling power combined with

dependability and long service at low cost.

Job-wise—you're right with Chevrolet. There's a Chevrolet truck to fit *your* job . . . with the right power, the right clutch, the right power-train to fit the need. And every unit of the Chevrolet truck you select is *engineered* for the job. Yes, to *do* your job right—with outstanding efficiency and economy.

Before you buy, get all the facts on Chevrolet—first-cost, operating cost and maintenance cost. Remember: For the last eight consecutive truck production years, users have purchased more Chevrolet trucks than any other make. See your local Chevrolet dealer now!

CHEVROLET MOTOR DIVISION, General Motors Corporation, DETROIT 2, MICHIGAN



Only Chevrolet Trucks Give You All These Advance-Design Features:

- TWO GREAT VALVE-IN-HEAD ENGINES: the 105-h.p. Loadmaster or the improved 92-h.p. Thriftmaster—to give you greater power per gallon, lower cost per load • POWER-JET CARBURETOR—smoother, quicker acceleration response • DIAPHRAGM SPRING CLUTCH for easy-action engagement • SYNCHRO-MESH TRANSMISSIONS for fast, smooth shifting • HYPOID REAR AXLES—for dependability and long life • DOUBLE-ARTICULATED BRAKES—for complete driver control • WIDE-BASE WHEELS for increased tire mileage • BALL-TYPE STEERING for easier handling • UNIT-DESIGN BODIES—for greater load protection • ADVANCE-DESIGN STYLING for increased comfort and modern appearance.

89,717,000
TONS OF
BITUMINOUS
COAL
were shipped by
RETAIL DEALERS
FOR DOMESTIC
USE IN 1948



This plant cleans 10" x 1/4" coal
in the Chance Cone for domestic
and industrial markets



CHANCE ORIGINAL "HEAVY DENSITY" COAL CLEANER

● Fairmont Machinery Company can help you capture your share of many desirable markets.

Clean coal, scientifically prepared, is always in demand at premium prices. Domestic users are aware of the additional advantages offered in correctly prepared coal for clean, economical heating.

Fairmont designs and builds complete coal preparation systems—Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning.

Fairmont Engineers are available to help you determine the method of coal preparation best suited to your operation.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

Designers and Constructors of Chance Sand Flotation Process for Wet Cleaning and American Pneumatic Separator for Dry Cleaning

PARIS MANUFACTURING COMPANY

Announces THREE NEW DRILLS

The PARMANCO Coal Drill will drill 2½ inch holes at a speed of up to six feet per minute in #5 coal. Equipped with heavy duty truck-type transmission and rear end and a complete hydraulic feed, the drill is operated by one man from the control seat. It is made in two sizes with a 12 h.p. or 25 h.p. gas motor and all units are completely self-contained and enclosed in oil-tight cases.

ALREADY USED by

Big Bend Collieries, Inc.	1	East Coal Co.	1
United Electric Coal Co.	1	Southwestern Ill. Coal Co.	1
Fairview Collieries Corp.	2	Truesdell Coal Company	2
Colonial Coal Co.	1	Wabash Field	1
Little Star Coal Co.	1	Harbison-Walker Refractories Co.	1
Home-Brooks Coal Mining Co.	1	Wesley Refractories Co.	1
Sherrill-Templeton Coal Co.	1	A. P. Green Fire Brick Co.	1

**THIS UNIT IS DELIVERING 6-INCH SHOT
HOLES — READY FOR LOADING
at Better Than Two Feet a Minute !!!**

The new PARMANCO Hi-Speed Horizontal Drill is completely redesigned around a 40 h.p. engine with four drilling speeds which, in field tests, has cut one-third off the footage drilling time — a cost-per-drilling-foot saving that we are passing on to the strip mine operator and contractor at no increase in our price. In addition the drill is equipped with a starter and generator, dual type front wheels, truck type rear axle with mechanical brakes and a traction drive with both forward and reverse.

PARIS
MANUFACTURING
COMPANY
Pittsburgh, Pa.

J. Robert Bazley Inc. finds Jalloy Heat-Treated Steel Plate

Pays off in Maintenance Savings

J&L STEEL



Welding Jalloy wear plates between tooth bases on an Esco drag bucket.

Heat-treated Jalloy bed liner plates and reinforcing strips cut deadweight —increase service life in this Euclid.



Patty Denberry, Supt., (left) and Pete Ambrose, foreman, discuss using heat-treated Jalloy to reinforce a drag bucket.

**Equipment Downtime Cut . . . FEWER MAN-HOURS SPENT ON REPAIR . . .
COST OF STEEL FOR MAINTENANCE LOWERED AND UNIT PRODUCTION
INCREASED WITH TOUGH J&L JALLOY HEAT-TREATED PLATE**

J. Robert Bazley, Inc., Pottsville, Pa., stripping and construction contractors, knows that high equipment maintenance costs can drain the profits right out of an operation. That's why they've standardized on heat-treated Jalloy plate for wear and reinforcing plates on equipment where impact and abrasion determine the service life of steel.

On Bazley's equipment, which includes 30 shovels and draglines, 36 Euclid trucks and approximately 95 other earthmoving pieces, heat-treated Jalloy applications include:

- ✓ Three-eighths-inch plate for truck body liners, reinforced with $\frac{1}{4}$ " strips 5" wide spaced on 11" centers. The $\frac{3}{4}$ " Jalloy liner replaced $\frac{1}{2}$ " high-strength steel, resulting in a weight saving of 500 lbs. per truck bottom.
- ✓ Three-quarter-inch wear plates between drag-bucket-tooth bases, 1" plates on side cutting edges and $\frac{3}{4}$ " shoes where sides join bottom of bucket.
- ✓ Other uses include dozer-blade corner plates and grader scraper teeth.

Result?—J&L heat-treated Jalloy lasts 4 to 6 times as long as mild steel previously used.

Why not check into J&L Jalloy, the steel that's produced exclusively by J&L to meet the needs of mining and quarrying men. Write today for your free copy of our booklet, "For Longer Wear . . . Less Repair—Jalloy J&L Special Alloy Steel." It'll give you the facts on Jalloy and tell you how others are saving money with this really tough mining steel.

JONES & LAUGHLIN STEEL CORPORATION

From its own raw materials, J&L manufactures a full line of carbon steel products, as well as certain products in OTISCOL and JALLOY (hi-tensile steel).

PRINCIPAL PRODUCTS: HOT ROLLED AND COLD FINISHED BARS AND SHAPES • STRUCTURAL SHAPES • HOT AND COLD ROLLED STRIP AND SHEETS • TUBULAR, WIRE AND TIN MILL PRODUCTS • "PRECISIONBILT" WIRE ROPE • COAL CHEMICALS

Jones & Laughlin Steel Corporation
411 Jones & Laughlin Building
Pittsburgh 30, Pa.

Please send me a copy of your free booklet, "For Longer Wear . . . Less Repair—Jalloy J&L Special Alloy Steel."

Name

Company

Address

C-E RAYMOND

Flash Drying

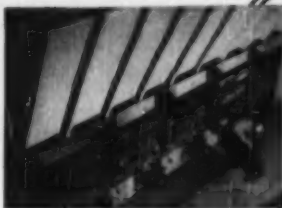
OFFERS NEW ECONOMIES IN THE PREPARATION OF FINE COAL SIZES



CONTROL PANEL



DRYING COLUMNS AND WET FEEDERS

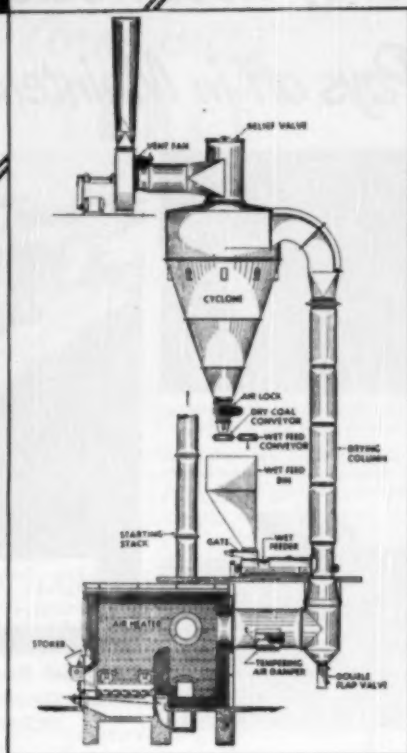


COAL HOPPER FOR SPREADER STOKER



VENT FAN

These typical units of equipment show how easily the Flash Drying System can be fitted to any plant.



FLEXIBILITY—An advantage of the Flash Drying System is its ready adaptability to any plant layout. The individual units of equipment with connecting piping and collectors can be placed on one or more levels and arranged to fit into your present plan of material handling.

CAPACITY—The C-E Raymond System provides maximum efficiency and economy in drying fine coal in a size range of $\frac{3}{4}$ " x 0". It is built in several different capacities. A single drying column has a range of 10 to 75 tons per hour. Multiple columns may be connected to a single furnace for still higher capacities.

MOISTURE RANGE—This type of equipment will handle initial surface moisture up to 12% without recirculation. With recirculation, there is no upper limit to initial moisture handled, and 25% to 30% is a common requirement, with final moisture content ranging from 0% to 3%.

OPERATING ECONOMY—The easy control, automatic operating features and low upkeep, make the C-E Raymond System an efficient and low-cost method of preparing fine coal sizes.

For complete details, write for your copy of this Flash Drying Booklet.



COMBUSTION ENGINEERING-SUPERHEATER, INC.

FLASH DRYER DIVISION, 1315 North Branch St., Chicago 22, Illinois



Ordinary metal nipple after 6 weeks' carrying highly acidulous mine water.



Aluminum nipple, two months after replacing nipple at left.

Unretouched photos
prove...

Alcoa Aluminum Lasts

Where acid mine waters eat through ordinary metal pipe in weeks, Alcoa Aluminum Pipe will last up to ten times as long, or longer. Based on current pipe prices, you make money when it doubles pipe line life.

Easier To Install. Alcoa Pipe weighs one-third as much as heavy metal pipe. It needs fewer men to install, eliminates frequent replacement. In low seams (40" or less) aluminum actually costs less installed.

Strong—Resists Rock Falls. Alcoa Aluminum 63S Pipe won't grow brittle, withstands rock falls and rough handling.

Fittings Available. Use familiar standard methods and fittings for Alcoa Aluminum Pipe. No change in installation practices. Get the whole story on Alcoa Aluminum Pipe—call your Alcoa representative or send for free booklet.

ALUMINUM COMPANY OF AMERICA
1979M Gulf Building
Pittsburgh 19, Pa.

Gentlemen: Please send copy of your booklet, "Alcoa Aluminum Pipe", to

Name

Company

Title

Company Address

City State





Advantages of **HEAVIER RAIL** in main haulageways

Time was when 60-lb rail could take the heaviest mine traffic uncomplainingly. Until recently, 60-lb was considered a heavy rail even for main haulageways. But times are changing. Loads are heavier, traffic is faster. Now a good many mines are going to Bethlehem 80- and 90-lb rail in the main-line haulage tracks.

This is paying off. Here are some of the reasons:

- ★ The heavier rail stands up better under today's crushing loads; requires less maintenance.
- ★ It makes possible *faster* trips with safety . . . even with heavy cutters, loaders, 20- to 35-ton motors, and high-capacity cars.
- ★ It saves wear-and-tear on the roadbed; with proper ballast the rails themselves absorb much of the punishment instead of passing it along to the substructure.
- ★ Heavy rail means less frequent replacement; hence keeps the system operating more hours per year.

Bethlehem is equipped to furnish mine rails in all standard weights, but strongly recommends that you consider the heavier sections when you open new mines or revise your present haulageways. And don't forget, we also make a *full line* of crossings, turnouts,

and accessories—switches, switchstands, frogs, rail braces, guard rails, joint bars, and steel ties. *Everything*—right down to the spikes, bolts, and nuts!



Trips are run fast and safely over this Bethlehem prefabricated track layout. It well illustrates the old principle that "good haulage starts with good track."

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation, Export
Distributor: Bethlehem Steel Export Corporation



EATON

2-Speed Truck

AXLES

Increase the trade-in value of your trucks

Buyers of used trucks know that vehicles equipped with Eaton 2-Speed Axles have been spared much strain and wear. That's because the Eaton 2-Speed doubles the usual number of gear ratios—provides a low and high for each transmission gear—supplies the right ratio for any road condition. Its low low affords extra pulling power for starts, and high high gives faster road speed. This permits the engine to run without "laboring" . . . results in less wear on vital power transmitting parts . . . less consumption of gas and oil.

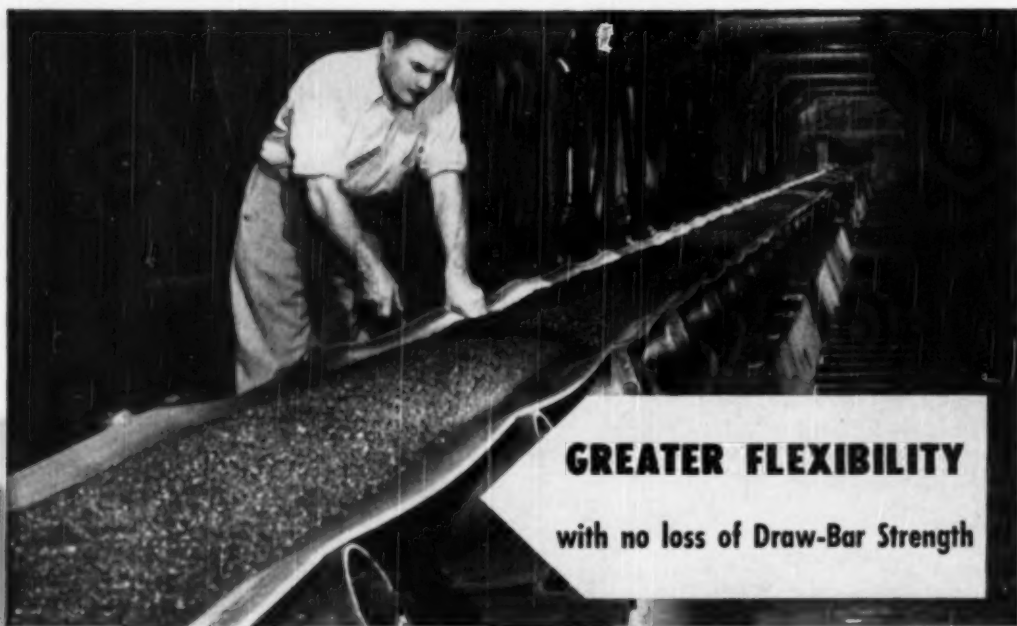
Yes, Eaton Axles more than pay for themselves in reduced maintenance, lower operating costs and increased trade-in value. Ask your truck dealer for proof.



Axle Division
EATON MANUFACTURING COMPANY
CLEVELAND, OHIO



PRODUCTS: SODIUM COOLED, PORRET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOULD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS • SPRING TITLES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BEARINGS, DYNAMOMETERS



GREATER FLEXIBILITY

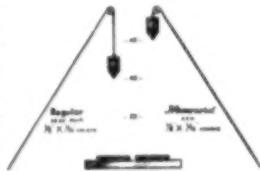
with no loss of Draw-Bar Strength

Homocord Conveyor Belt Runs Truer ... Carries Bigger Loads Without Spilling

Supreme lateral flexibility enables a Homocord Conveyor Belt to trough naturally. It runs truer in the idlers than conventional belts because the Homocord construction makes adequate contact with the center roller at all times. This insures safe transportation of maximum loads without spillage. Homocord Conveyor Belt can be made endless with vulcanized splice or metal fasteners with *no loss of draw-bar strength* over the heaviest conventional duck conveyor belts.

Tests Prove Homocord Has 50% More Cushion Against Impact

In a "Guillotine" Test, as shown here, a heavy metal weight ground to a blunt edge is dropped from various heights on samples of belting. When dropped from a height of 40" on a sample of 4-ply



32-oz. duck belt with 1/8" top cover and 1/16" bottom cover, the impact cuts through the cover to the duck. On the other hand, a 4-ply AEH Homocord sample with 1/8" top cover and 1/16" bottom cover begins to show the same impact effect from a drop of 60"—thus proving at least 50% more cushion in the Homocord strength member.

Homocord is priced a little higher but it costs far less on every installation where it is recommended. Customers report remarkable service and tonnage records. If you have not "discovered" Homocord, by all means call your Manhattan distributor or a Manhattan belting engineer and let him show you the greater value in this modern belt.

DO YOU HAVE THIS FOLDER?

Bulletin No. 6906 on Homocord should be in your files.

A copy will be mailed to you, on request.



Ray-Man, New Tension-Master Conveyor Belt for Long Lifts

... the first to be engineered with rayon strength members. Recommended where it is desirable to reduce the number of transfer points on a long lift.

MANHATTAN RUBBER DIVISION — PASSAIC, NEW JERSEY



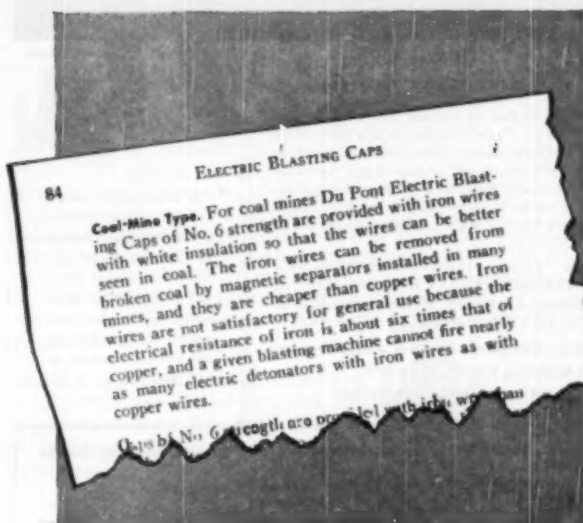
RAYBESTOS-MANHATTAN, INC.

Manufacturers of Mechanical Rubber Products • Rubber Covered Equipment • Radiator Hose • Fan Belts • Brake Linings • Brake Blocks • Clutch Facings • Packings • Asbestos Textiles • Powdered Metal Products • Abrasive & Diamond Wheels • Bowling Balls



HANDBOOK TIP FOR COAL MINERS

Du Pont Electric Blasting Caps with Iron Wires Are More Economical



Whether you're firing single shots or multiple shots where sufficient current is available, Du Pont Iron Wire Electric Blasting Caps help keep costs down. Although iron wires have a higher resistance than copper, they cost less and produce satisfactory results at all times. Read what the Du Pont *Blasters' Handbook* has to say about these dependable and efficient iron wire caps.

Ask any Du Pont explosives representative to tell you more about these economical Iron Wire Electric Blasting Caps and other dependable products for efficient coal-mining operations in Du Pont's complete line of blasting supplies and accessories. E. I. du Pont de Nemours & Co. (Inc.), Explosives Dept., Wilmington 98, Delaware.

DU PONT EXPLOSIVES

BLASTING SUPPLIES AND ACCESSORIES



BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

How the BWH ROTOCURE PROCESS eliminates OCS*

— a major cause of Premature Belt Failure



IN every 30 to 40 feet of belting cured by the flat press method, there's a 2" to 4" danger zone which often means trouble ahead. These zones consist of overcured or doubly cured segments — the result of "stop and go" vulcanization in which the previously cured portion is advanced less than a press length. These overcured sections constitute a mere 1/240th to 1/90th of the belt but invite serious surface wear and structural weaknesses that can cause early failure of the entire belt!

Not so with BWH ROTOCURED belts, however. They are the only belts made by a continuous, never-ending curing technique. THERE ARE NO OVERCURED SEGMENTS. ROTOCURE (even, uniform cure) benefits users 4 specific ways as it steps up efficiency and cuts belt maintenance costs. RESULT: LOWER COST PER TON OF MATERIAL CONVEYED!

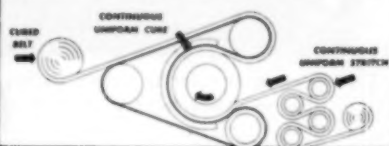
1. Because there is no double vulcanization, uniform abrasion resistant covers are always assured.
2. Continuous vulcanization eliminates overlaps which can reduce flex life up to 40%.
3. Mechanical distortion (inherent with flat press curing at the press ends) is eliminated.
4. Constant, uniform stretch results at all times.

BWH ROTOCURED BELTS will give you appreciably longer performance, lower your costs and spare you maintenance headaches. Remember, only BWH Conveyor belting offers you the decided advantage gained through the exclusive ROTOCURE PROCESS.

P. S. If you're interested in transmission belting, look to BWH and ROTOCURE for all the above PLUS advantages! BWH transmission belts have a higher coefficient of friction because dusting agents are not required. RESULT: belt tensions are minimized and belt life is extended.

* "Overcured Sections." You won't find them in BWH Rotocured Process Belts. These critical sections are present every 30' to 40' in all belts made by the flat press process. Only Rotocuring eliminates this cause of belt failure.

DIAGRAMMATIC SKETCH OF EXCLUSIVE ROTOCURE PROCESS



Another Quality Product of

BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in all Principal Cities

PLANT: CAMBRIDGE, MASS. • P. O. BOX 1071, BOSTON 3, MASS., U. S. A.



The only
compressed-air-tight valves
are valves designed for
compressed air



GRINNELL-SAUNDERS DIAPHRAGM VALVES

Invented by a mine engineer to stop air leaks. A rubber diaphragm seating on metal gives positive closure, even when scale is lodged on the weir. At the same time, working parts are isolated from the air lines so that no packing glands are needed, no stem leaks are possible. That was the idea behind the Grinnell-Saunders Diaphragm Valve. As one engineer said, "When about a third of your air compressors are just pumping air out through leaks and this diaphragm valve eliminates the leaks, cutting out one-third of your air costs, why you've really got something."



Diaphragm gives leak-tight closure against grit, scale, solid matter. The resilient diaphragm, plus the large area of contact, gives leak-tight closure against pressure or vacuum. You can't keep scale out of compressed air lines but tests prove that Grinnell-Saunders Diaphragm Valves give perfect closure when scale up to 1/6" diameter is trapped in 1" valves and up to 1/4" solids in larger valves.

No "freezing", no clogging, because all working parts are sealed off from compressed air and moisture.

Friction loss reduced by streamlined flow in both directions. Diaphragm lifts high to give unobstructed passage. Friction coefficient remains practically constant throughout range of valve sizes.



Inexpensive maintenance without removing valve from line. Diaphragm is only part that normally wears and needs replacement. Often lasts for years since compressor and finger plate support it in all positions. Quickly, easily replaced without removing valve from line. No refacing, no disc holder, no packing glands.



Self-financing through compressed air savings. This table from "Compressed Air Data Book" shows how fast you can pay for Grinnell-Saunders Diaphragm Valves out of the compressed air savings, and, perhaps, avoid the purchase of larger compressors.


Size of opening (inches)	Cu. ft. wasted per month at 100 lbs. pressure based on nozzle co-efficient of .65	Cost of waste per month based on 5 cents per 1000 cu. ft.
3/8	6,671,990	\$400.31
1/4	2,920,840	175.25
1/8	740,210	44.41
1/16	182,375	10.94
1/32	45,598	2.73

Diaphragms, body and lining material to meet all conditions. Bodies stocked in cast iron, malleable iron, stainless steel, bronze and aluminum (other materials on special order). Linings of lead, glass, natural rubber or neoprene. Diaphragm materials, natural rubber or synthetics. Write for the Grinnell-Saunders Diaphragm Valve Catalog.



GRINNELL

Grinnell Company, Inc., Providence, R. I. Branches: Atlanta • Billings • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach • Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Pocatello • Philadelphia • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane



61,000,000 TONS OF PROOF

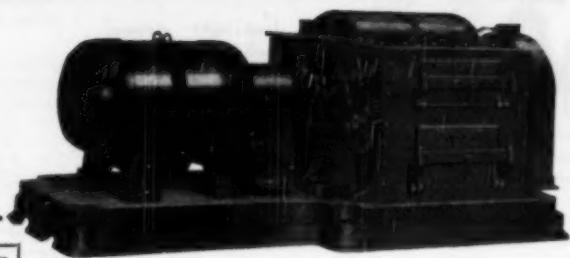
*Decisive Evidence of the
Built-In Quality of*

AMERICAN CRUSHERS

A REPORT FROM 29 COAL MINES AND POWER PLANTS

These significant facts are the result of a recent independent survey in which American Crusher users gave their reports—based on 61,161,372 tons of crushed coal:

(1) Total cost of operation of American Crushers was less than 1c per ton.



(2) Average parts replacement cost was \$.0012 per ton (including cost of standby parts not yet used).

(3) Average age of American Crushers at time of survey—9.35 years.

Conclusive proof that Americans are "built to take it"—built to produce year after year, ton after ton.

Write for your copy of "AC Coal Crushing Bulletin."

American

PULVERIZER COMPANY

*Originators and Manufacturers of
Ring Crushers and Pulverizers*

1119 MACKLIND AVE.
ST. LOUIS 10, MO.

ROCK RATED!



THE NEW

P&H

MODEL 955-A (2½ YDS.)

with **MAGNETORQUE*** swing

Watch this new machine get its teeth into a rock job and see what "rock-rated" really means to you. It's *designed* . . . every inch from boom point to crawler shoes . . . to make rock handling easier . . . more profitable for you.

Unbeatable—point for point

P&H Magnetorque eliminates swing friction clutches . . . their troubles and replacement costs. It gives you smoother, faster swings . . . for the life of your machine.

Greater Stability gives you more power at the tooth point . . . and greater work capacity.

Direct Acting Hydraulic Control . . . easier on machine, easier on operator . . . smoother and greater holding power through full wrap brakes and clutches.

*Trade-Mark of Harnischfeger Corporation for electro-magnetic type clutch.

P&H Rapid Reversing Planetary Chain Crowd gives you snappier dipper action. It's more accurate. And crowd chain outlasts 25 to 30 crowd cables.

Get the facts about P&H all-welded strength and Added Values! The 955A is a 2½ yd. version of the P&H 1055 (3 yd. shovel) . . . the machine that has set new low-cost production records everywhere. Write for Bulletin X122, today.

P&H

EXCAVATORS

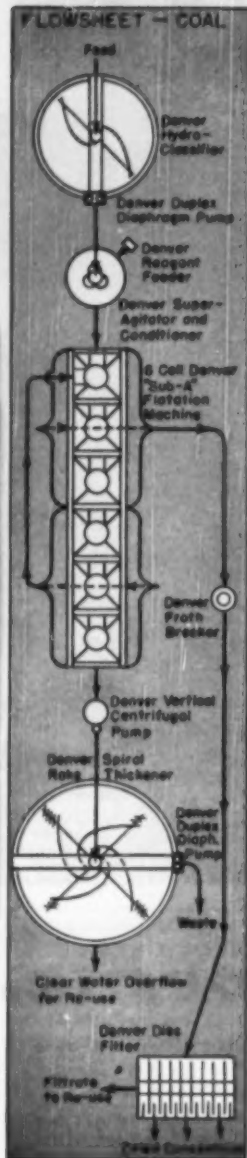
4540 West National Ave.
Milwaukee, Wisconsin

HARNISCHFEGER

1221

SCAVENERS • OVERHEAD CRANES • MOISTE • ARC WELDERS and ELECTRODES • SOIL STABILIZERS • CRAWLER and TRUCK CRANES • DIESEL ENGINES • CAME LOADERS • PRE-ASSEMBLED HOMES

DENVER EQUIPMENT IN COAL PROCESSING



Denver Hydroclassifier... For accurate slime separation from minus 150 mesh to colloidal. Feed is distributed through quiet zone via center feed-well. Undisturbed fines rapidly overflow to side launder while coarser particles settle to bottom of cone shaped discharge. Diaphragm pumps control discharge. Get Bulletin C4A-8.

Denver Agitator-Mixer

...Thorough mixing of every coal particle is an important factor. Feed is through central stand-pipe directly into agitation zone. Bulletin A1-81.

Denver Reagent Feed-

ERS... Exact flow of reagent is accurately controlled for most economical and highest metallurgical results in subsequent flotation. Bulletin F6-56.

Flotation, Standard

"Sub-A"... Conditioning, cleaning and re-cleaning can all be accomplished in a single bank of Denver "Sub-A" Flotation Cells without resorting to pumps and elevators. Bulletin F10-850.

Flotation, Lasseter

"Sub-A"... A special Denver Flotation Machine with rakes designed to remove and partially dewater the thick, dense, low-ash content coal floated to the surface. Bulletin F10-850.

Centrifugal Pumps...

Downward flow of feed directly onto runner permits handling any coarse (up to 1/4") or frothy material that will flow by gravity. Bulletin P10-8.

Diaphragm Pumps...

"Adjust this pump while it runs" to regulate and control flow of heavy pulp or sludge. Rubber valves and valve seats are easily replaced. Bulletin P8-57.

Denver Spiral Rake Thickeners...

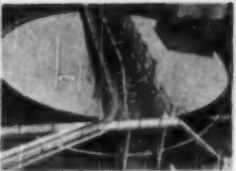
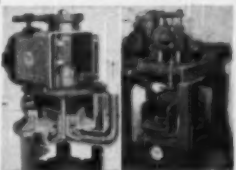
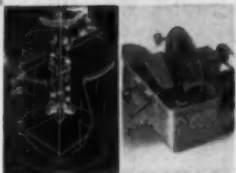
Patented spiral rakes will usually move settled sands from periphery to center discharge cone in one revolution. Worm gear and pinion are completely enclosed and operate in a bath of oil. Low-head superstructure consumes a minimum of space. Denver Adjustable Stroke Diaphragm Pumps accurately control flow of settled particles. Get Bulletin T5-84.

Denver Disc Filters...

You get a drier product with a Denver Disc Filter because of the patented arrangement of filtrate drainage grooves whereby gravity aids the suction draw-off of filtrate. Dried cake is positively discharged with scrapers and low pressure air. Filter segments are easily replaced even while machine is running. Get Bulletin No. F9-82.

Denver Testing Service...

Batch testing followed by pilot plant testing to arrive at the most economical process and flowsheet is always a wise step before any equipment is purchased. Denver Equipment maintains laboratories to serve you, or you may use the equipment in Denver, or you may purchase your own laboratory testing equipment. We are ready to work with you. Send for Bulletin No. L03-87.



FLotation ENGINEERS



"The firm that makes its friends happier, healthier and wealthier"

DENVER • NEW YORK • CHICAGO • EL PASO • VANCOUVER • TORONTO • MEXICO, D.F. • LONDON • JOHANNESBURG

DENVER EQUIPMENT COMPANY, 1403 17th St., Denver 17, Colorado

All TREASURE *isn't buried in Sand!*

Millions of tons of marketable coal are lying on top of the ground already mined in vast slurry ponds. The C-M-I Continuous Centrifugal Dryer can help you to turn this treasure into salable coal.

The C-M-I Centrifugal Dryer is the efficient, profitable and economical answer to all of your dewatering problems.

Reduces Water Content. The C-M-I Dryer reduces the surface moisture of newly washed coal. It takes off the greatest volume of water thereby reducing the cost of heat drying, the more expensive method.

Reduces Ash Content. All of the clay and other soluble substances contained in the water removed by the action of the C-M-I Dryer is completely separated from the finished product. Pyrites and other foreign substances are also removed by this process.

Check List for the **C-M-I DRYER**

Efficient—The C-M-I Dryer will reduce the water content of 28 tons of slurry from 82% to 7 1/2 % in less than one hour!

✓
YES NO

Profitable—Figures submitted by operators using the C-M-I Dryer show that in slurry salvage alone, the extra profits will pay for the equipment in a few months time.

✓
YES NO

Capacity—The large C-M-I Dryer will handle as much as 75 tons of 3/8" x 28 mesh coal per hour, reducing the water content from 25% of surface moisture to 6% or less.

✓
YES NO

Durable—All parts are made of the best metals obtainable. Revolving parts are dynamically balanced on the latest type of balancing machine.

✓
YES NO

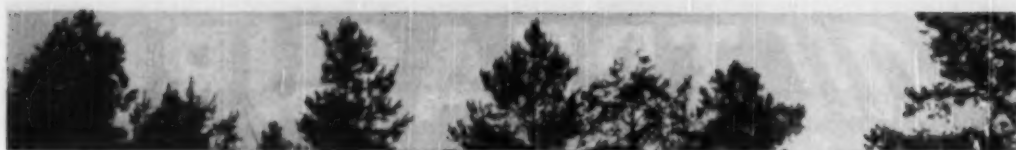
Economical—In many instances, the C-M-I Dryer eliminates costly heat drying normally required.

✓
YES NO



If you are interested in how your dewatering problems may be solved with a C-M-I Dryer, write to us, stating the sizing of the coal, such as the percentage on 8 mesh, 10 mesh, 20 mesh, 35 mesh, 65 mesh and 100 mesh standard Tyler screens, and also the amount passing through 100 mesh. We will make our recommendation at no cost to you.

CENTRIFUGAL & MECHANICAL INDUSTRIES, INC.
146 PRESIDENT STREET ST. LOUIS 18, MO.



Bargain Yardage with This Team



BIG yardage at low cost is the bargain delivered by this hard-working "Big Red" team — International TD-24 crawler tractor and Bucyrus-Erie Bullgrader or bulldozer. That's because addition of this blade equipment leaves tractor balance point virtually unchanged . . . full tractive effort is available for the tough jobs. Scientifically curved blade keeps the load "live" . . . keeps it rolling to move greater yardage per horsepower. Full visibility and ease of control make it easy for the operator to see exactly what his blade is doing, to work at top efficiency without fa-

tigue. Control levers are quickly responsive, easy to handle, positioned for greatest convenience. Bucyrus-Erie's balanced design means less tractor wear, too, while quality construction of top-grade steels and alloys add to long, profitable machine life. See your International Industrial Tractor distributor for complete details.

339700

**BUCYRUS
ERIE**

SOUTH MILWAUKEE, WISCONSIN

*Eliminate worry over
frozen coal supplies*



PERMATREAT COAL SPRAY

SPEEDS DE-WATERING... PREVENTS FREEZING

This modern oil treatment speeds the de-watering of coal at the mine, keeps it out of the car and stockpile, thus eliminating the cause of freezing in winter.

PERMATREAT Coal Spray is easily applied at the mine after the coal is washed. Sprayed on under pressure, it coats every particle of coal. Water runs off as quickly as though from a duck's back. Melting snow and rain encountered in transit trickle through the load, does not have time to freeze into a solid mass.

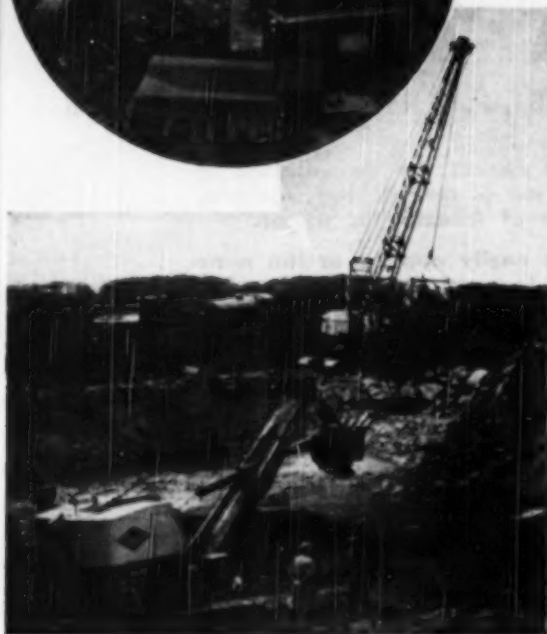
Dealers say they seldom have to use shake-outs or other methods to unload cars of oil-treated coal. Industrial users find it speeds up removal of coal to stockpile and eliminates frozen coal stocks that require more time and labor to move.



ASHLAND OIL & REFINING COMPANY

Ashland, Kentucky

LIMA RUGGEDNESS and DEPENDABILITY make GREATER PROFITS possible



● The narrower your margin of profit, the more important to you that your equipment be designed and built for maximum output and continuous, dependable, trouble-free service.

That's why LIMA Shovels, Cranes and Draglines are ideal for quarry and open-pit mining operations. Simplicity of design means fewer parts to get out of order. Important bearings are anti-friction type. Large drums increase output and minimize cable wear. Permanently aligned shafts prevent chattering and grabbing of clutches. Large clutches and brakes reduce lining wear. Extra rugged machinery base, truck and front-end equipment provide ample strength for heavy, punishing service.

These are only a few of the reasons why LIMA machines are your best investment when profits depend upon low operating and production costs.



The LIMA line includes Shovels 1/4 to 6 yards, Cranes to 110 tons, and Draglines variable. Rubber-mounted truck cranes in 20 and 35 ton capacities

Lima Shovel and Crane Division

LIMA, OHIO

OTHER DIVISIONS: Lima Locomotive Works Division; Niles Tool Works Co.; Hooven, Owens, Rentschler Co.



Important to **MODERN MINING**



LINK-BELT ROLLER CHAIN ON EQUIPMENT FOR TRANSPORTATION

Mechanized mining demands ever moving and dependable shuttle cars. Link-Belt has developed Precision Steel Roller Drive Chains which assure such service because they — are able to absorb shock, transmit heavy loads yet remain light in weight, provide long-lived drives, and they allow for flexibility in design.

These characteristics are the result of properly engineered chains being manufactured from selected materials, scientifically heat treated, carefully assembled and tested.

Link-Belt Cut Tooth Sprockets are a companion to Link-Belt Precision Steel Roller Chains.

Our engineers will be glad to give you the benefit of their experience in applying chains to your specific requirements.

LINK-BELT COMPANY

© 1960

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va.,
Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6,
Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Johannesburg.



"All motors are NOT alike!"

Check these

15 Reasons Why the RELIANCE Bearing Design is the BEST one!

**ONLY
ONE MOTOR
HAS ALL THESE
DESIGN
FEATURES:**

DESIGN A



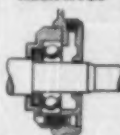
Pre-lubricated
cartridge—
bearing mounted
in bracket

DESIGN B



Open bearing
mounted in
bracket

RELIANCE



Double-shielded,
pre-lubricated
bearing mounted
in bearing cap

Bearing sealed from dirt and other foreign material	YES	NO	YES
Enclosed bearing housing	NO	YES	YES
Bearing can be re-lubricated without being disassembled	NO	YES	YES
Motor can be re-greased without removing drain plug	**	NO	YES
Automatic grease relief to suit any lubrication system	NO	NO	YES
Protection against grease entering windings	YES	*YES	YES
Balls free of direct pressure during lubrication	YES	NO	YES
Bearing can be removed without danger of distortion	NO	NO	YES
Reservoir to protect against under-greasing	NO	YES	YES
Standard commercial ball bearings	YES	YES	YES
Larger grease reserve than provided with any standard bearing	NO	YES	YES
Grease supply free of churning action	NO	NO	YES
Measuring unnecessary to prevent overgreasing	NO	*YES	YES
Unnecessary to grease equally at each side of ball race	NO	YES	YES
Lubricant is retained in ball race	YES	NO	YES

** Means is not provided for relubrication of assembled motor.

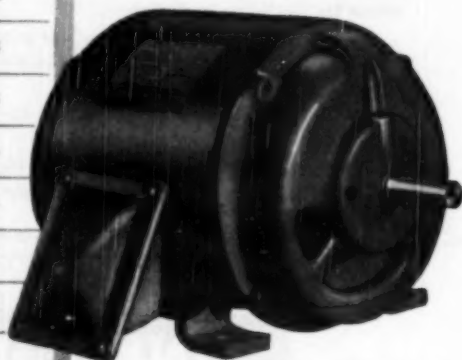
*YES, if drain plug is removed.

The Reliance Pre-lubricated Bearing Design has all of the features vital to maximum motor life. Check these points in the chart at left. The performance of Reliance PRECISION-BUILT Motors in all industries and under all operating conditions has proved their value in long-wearing, trouble-free bearing design.

In most applications, Reliance PRECISION-BUILT Motors operate satisfactorily for years without relubrication. Where it is a practice to grease regularly or where operating conditions make it desirable... it is impossible to overgrease a Reliance Motor. Write for new Bulletin B-2201 for the "inside story" of the Reliance Pre-lubricated Bearing Design.



Reliance PRECISION-BUILT A-c. Motors from 1/4 to 300 Hp.



Sales Representatives in Principal Cities

RELIANCE ELECTRIC AND ENGINEERING CO.

"All Motors are NOT Alike!"

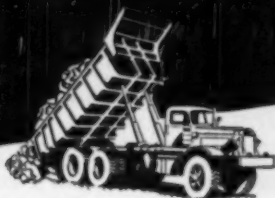
1113 Jackson Road, Cleveland 10, O.H.

TORTURE TAKERS

RECORD BREAKERS

MONEY MAKERS

Firestone TIRES



TIRES used in rock work, strip mining, and earth moving have to face a terrific amount of torture. Whether they make or lose money depends on how *well* and how *long* they can take that torture.

Firestone tires can **TAKE** it. Time and again they break old performance records, set new records for long service. Such performance is no accident. The extra tough, job-designed treads and the all-rayon Gum-Dipped cord bodies — protected by four extra impact plies and extra-thick sidewalls — explain why Firestone tires turn in *better* work and turn out *more* work.

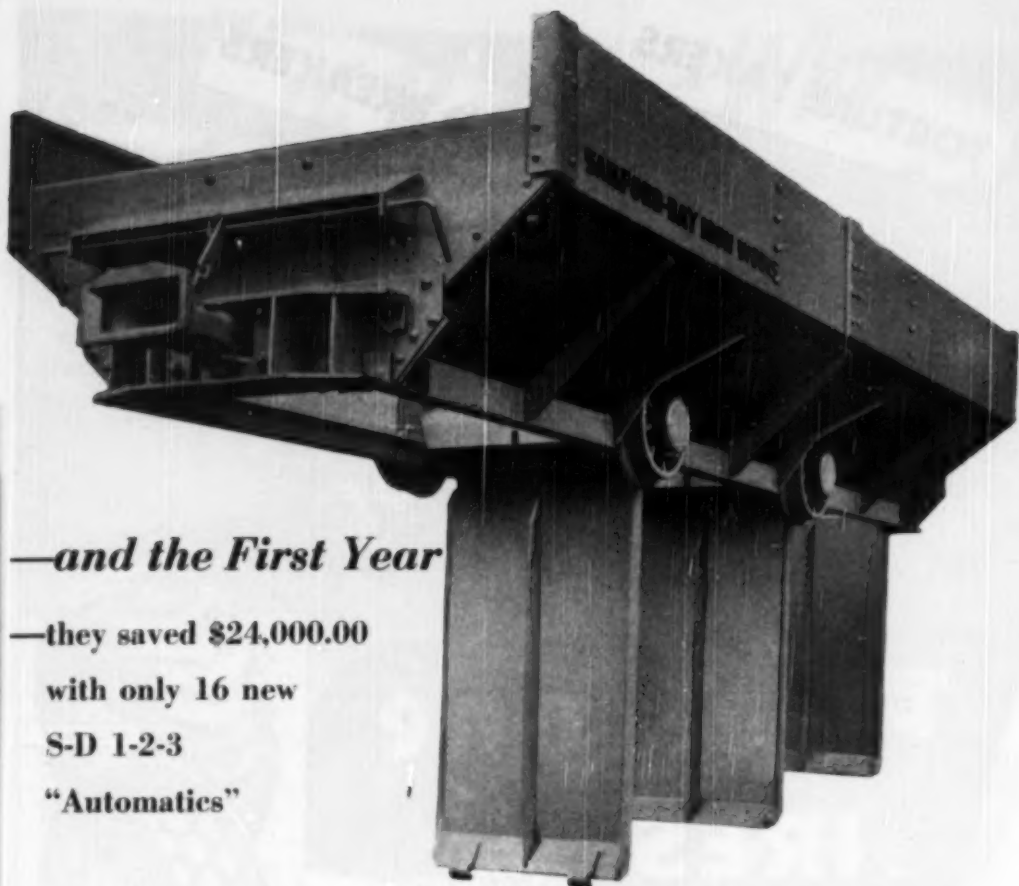
Not far from your project there's a Firestone Dealer or Store organization prepared to handle your complete tire needs and lower your operating cost. They will welcome the opportunity to call on you and show how this can be done.

WHEN YOU BUY NEW EQUIPMENT OR REPLACEMENT TIRES
SPECIFY FIRESTONE OFF-THE-HIGHWAY TIRES

Listen to the Voice of Firestone on radio or television every Monday evening over NBC

Copyright, 1950, The Firestone Tire & Rubber Co.





—*and the First Year*

—they saved \$24,000.00

with only 16 new

S-D 1-2-3

“Automatics”

No, the new cars alone didn't save all this money but the S-D “Automatic” system of haulage did. Think about it . . . fifteen hundred dollars saving per car per year . . . in a small tonnage mine by changing over to the S-D “Automatic” system of moving coal from the mine to screening plant with only sixteen cars. And this saving of \$24,000.00 was in man hours alone, based on 250 working days annually . . . an actual case on record.

The S-D “Automatic” system comprises any number of required cars (usually one-third to one-half the old cars) plus an adequate storage bin. This combination has proved beyond question its low cost per ton advantages. A storage bin of sufficient capacity is essential to constant coal production and low cost operation. First, it permits full time mine operation with only part time operation of screening plant. Second, it guarantees independent non-stop operation of either screening plant or mine in case of temporary shut-down of one or the other. Use of the bin is possible only with drop-bottom “Automatic” cars and no other type of haulage. This bin is, in fact, the control point between mine and screening

plant for a balanced operation. Incidentally, the bin supplies the continuous, even flow of coal so necessary to effective screening plant operation.

These sixteen cars were paid for, out of the savings at this mine, in *seven months*. Continued savings will pay for the storage bin cost shortly.

Many coal mine operators are waking up to the fact that the tremendous savings resulting from a change-over to the S-D 1-2-3 “Automatic” system of coal haulage is vital to maximum profits.

There are other operators, however, who are completely unaware of the fantastic losses they are taking simply because they haven't investigated the S-D “Automatic” System of moving coal.

Not every change-over, of course, offers the same opportunity for cuttings costs, but in every case, large savings are obvious. In fact, the potential savings today are much greater because of inflated operating costs.

If you are using obsolete, worn out cars in your mines . . . and without a storage bin, let one of our engineers discuss improvements that will turn your losses into profits. Drop us a line today.

SANFORD-DAY IRON WORKS KNOXVILLE, TENNESSEE

Barber-Greene



There's a common answer to the problem of moving bulk materials —everything from wet Feldspar to heavy iron ore—in the fastest, most economical way. B-G Belt Conveyors have proved this time and again in numerous underground and surface installations.

And unique among all belt conveyor manufacturers, Barber-Greene offers the benefits of Barber-Greene "pre-engineering." B-G Conveyors come to you as packaged units, clearly marked for simple assembly without extra fabrication and "blueprint" work. See your Barber-Greene distributor.



BARBER-GREENE COMPANY • AURORA, ILLINOIS

Constant Flow Equipment

LOADERS

PERMANENT CONVEYORS

PORTABLE CONVEYORS

COAL MACHINES

SILTUMINOUS PLANTS

FINISHERS

DITCHERS

WIRE COUNTERED PRIMACORD

makes it easy . . .



WIRE COUNTERED PRIMACORD is *armored* with closely stranded brass wire. This wire countering has 2 important advantages:

1. The wires increase the *tensile* strength of the Primacord.
2. The wires *resist abrasion*: protect the Primacord during loading operations, or when it is used in ragged holes.

For these reasons, Wire Countered Primacord is favored when the going gets rough. It is recom-

mended for use as down lines in deep or ragged holes. Hook up to the main line with a simple half-hitch — it is not necessary to strip the wires to secure positive detonation.

There is a grade of Primacord to meet every blasting condition: Plain, Reinforced, Wire Countered and Plastic Covered. Each is flexible, easily handled from spools containing 500 and 1,000 feet each; waterproof, and insensitive to stray electrical currents.

Ask your explosive supplier, or write to The Ensign-Bickford Company, Simsbury, Conn.

Wire Countered

PRIMACORD-BICKFORD Detonating
Fuse.

DECEMBER, 1950

IVAN A. GIVEN, EDITOR

Sharing for Profit

IDEAS—what they mean and how you get them—is the theme of the feature leading off this issue of *Coal Age*. At first glance, this might look like an unlikely subject for any publication, let alone an industry one. Nevertheless, ideas are all-important. They mean better business for a coal company, a better future for the coal industry, and a better living for managers, supervisors and men. And there are ways of getting more and better ideas.

A prime source of good ideas is the pages of the publications serving the industry. Not the least of these is *Coal Age*. It follows, therefore, that as *Coal Age* presents more ideas the opportunities for gaining helpful information leading to better mining, preparation and safety are increased. And when the industry moves ahead, the ground is laid for company and individual progress as well. Ideas are the motive power—your ideas, the other fellow's ideas, everybody's ideas. You have a part in the process. By sharing your ideas through *Coal Age*, you not only help your company and your industry but also yourself.

Added Starter

TO PARAPHRASE an old advertising slogan, "They laughed when I set out to melt snow." But now, the situation is a little different. Among other things, the subject has become important enough to provoke a complete book devoted to methods, cost and results ("Snow Melting," T. Napier Adam, The Industrial Press, 148 Lafayette St., New York 13). This is a reflection of the growth in number of railroad yards, airports, road crossings, bridge approaches, street intersections, sidewalks, home driveways, etc., equipped to eliminate snow by heat. Handling snow by conventional methods is a costly process. In New York City, for example, the cost of clearing one heavy snow is reported at \$2 million or more. This is only the direct cost, and does not

count the cost to industry and residents in losses and expense. Melting, therefore, has a lot of room in which to work. Coal is of course the logical source of the heat, and as melting increases so will the market. In fact, by pushing the idea with municipalities, and with road commissions and other governmental bodies, coal men undoubtedly can speed up and expand the movement—to their own benefit.

More Safety Sooner

MINE SAFETY is the result of thought and action along many lines: wholehearted management backing, selling the value to the individuals, making plant and equipment as safe as possible, neutralizing or eliminating flammable and explosive materials, adopting accident-proof methods and training men and supervisors in safe operation. Still another, as yet not too much employed in coal mining, is some tangible reward for good results. Among the latest to offer such awards is the Jones & Laughlin Steel Corp. Declaring that it had no wish to profit from safety improvements, the corporation recently announced that savings in insurance and compensation would be channeled to welfare and hospital activities in the communities where its plants are located. Thus, such activities in and around California, Pa., will benefit by \$16,400 this year as a result of 1949 improvements at the corporation's Vesta-Shannon mines.

True, the real reward for safety is freedom from the risk of injury or death. But it must be admitted that getting conscious acceptance of this fact often requires major effort over a long period of time, during which improvement is slower than might otherwise be the case. This leads to the conclusion that something of a more-tangible nature might supply a better incentive for improving the safety record. The Jones & Laughlin method is one. There are many others. The results where they have been adopted warrant serious consideration by any organization striving for maximum safety.



What More and Better Ideas Mean

- Advancement for You
- Better Business for Your Company
- Low Cost, High Quality for Coal Users
- Safety for Miners
- Strength to Beat Competition

How You Can Get More and Better Ideas

- Creative Thinking on Problems
- The Inspirational Route
- Transfer and Adaptation

Getting Ahead With Ideas

**HOW CAN YOU GET IDEAS in coal mining?
And what good are ideas anyway?**

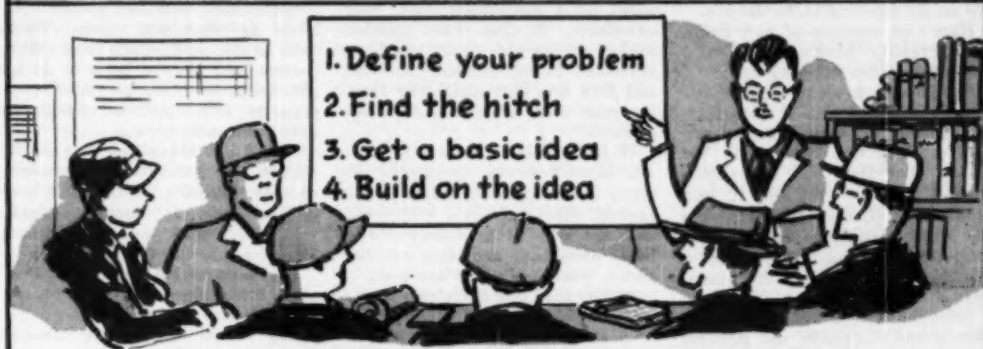
EVERY TIME you, your mine, your company or the whole coal industry moves forward, it's because somebody has an idea and puts it to work. Your own ideas helped you move up to the position you have now. Ideas improved your company's operations and helped it stay in business. Ideas led the coal industry, in the last 20 yr, far out ahead of its pick-and-shovel days.

In the years ahead, you, your company and your industry will move forward in the same way—by producing ideas and putting them to work. But the dif-

ference between yesterday and today is that yesterday's speed of advance is too slow for today and tomorrow. To prosper as the Nation's major supplier of energy, to press forward against competition from other fuels and to stay on the profit side while paying high wages to miners, the industry must produce more and better ideas at an ever-faster speed.

Likewise, if you expect to keep up with your industry and move out in front within your own company, you yourself must create more and better ideas.

HOW YOU CAN PRODUCE MORE IDEAS



1. BY DELIBERATE CREATIVE THINKING



2. BY INSPIRATION



VISITS TO OTHER MINES



COAL MEETINGS



INDUSTRY MAGAZINES

3. BY DIRECT TRANSFER and ADAPTATION

How Can You Produce More Ideas?

IDEAS ARE PRODUCED in three ways. Whether your job is underground, on the surface or in the office, these ways are the same. Here they are:

1. By deliberate, creative thinking.
2. By inspiration.
3. By direct transfer and adaptation.

Take them up one by one:

1. Getting ideas by creative thinking.

This way, you start out with a

specific problem—a transportation bottleneck, say. You go to work, either alone or, more likely, in conference with your associates.

To produce the needed idea, as a West Virginia coal operator recently explained, you'll want all the information you can gather. "Problems," he observed, "may come unexpectedly or may be anticipated, but in either case as much information as possible is necessary. Such information can be best obtained by discussion with one's associates in the business, and also by reference to such information as is carried in *Coal Age*, which no doubt in its broad coverage of coal mining has related articles."

With the problem defined and the information gathered, you then start to work to produce your idea. A western Pennsylvania coal man describes the process this way: "When an idea is produced, it comes up in most cases from conscious effort to solve a problem, moving logically from one step to the next until the idea is fully shaped."

The steps in conscious idea production are as follows:

1. Analysis of the problem—its origin and the fundamental hitch.
2. Search for a principle that will eliminate the hitch or offset its effects.
3. Translation of this principle into a workable plan for a new method or machine.
4. Putting the new method to

You Can Never Get ENOUGH Good Ideas—But Here's How You Produce MORE

work, building the new machine from scratch, buying a machine that will fit the principle or adapting an old machine to do the job.

Here's an example of how deliberate, creative thinking produced a coal-mining idea not long ago:

Shuttle-car haulage behind the loading machine was a bottleneck at Crichton No. 4 mine, Johnstown Coal & Coke Co., Nettie, W. Va. Seeing that they had a problem, officials took the first step in idea production; that is, they analyzed the problem and saw that repeated interruption of loading because of shuttle-car change was the fundamental hitch.

Second, looking for a principle that would eliminate the problem or offset its effects, they worked out the principle of a continuously advancing discharge point behind the loading machine.

With that, they moved on to Step 3. Translating their principle into a workable idea, they dreamed up a bridge conveyor, with one end attached to the loader and the other end riding on wheels on top of a room conveyor. The room conveyor, with its sides serving as the rails for the free end of the bridge, would be extended periodically by throwing in a new section as the loading machine advanced. Thus the free end of the bridge would provide a continuously advancing discharge point into the room conveyor.

Finally, taking the fourth step, Johnstown officials started out to design their bridge conveyor. But before they had gone far, they discovered that a manufacturer had designed a conveyor that very nearly filled the bill. With a few changes, this unit was adapted and put to work in Crichton No. 4 mine. The result was an immediate increase from 10 to 20 tons per man-day at the mine, with more to come.

That's how the men at Johnstown Coal & Coke Co., facing a problem, advanced consciously and logically from one step to the next in the production and application of an idea. It paid off. The story is told in the August, 1950, issue of *Coal Age*.

2. Getting ideas by inspiration.

Does it seem to you that your best ideas sometimes come in the twilight zone between sleeping and waking, when you can't very well follow them up? Does the tip of an idea sometimes come to the surface

and then submerge again before you can grasp it fully because something distracts you? In the midst of a conference with your associates, do you have sudden flashes of insight about problems unrelated to the question at issue and then lose that insight by forcing your mind back to the subject at hand?

If these things happen to you, you needn't worry too much, because they happen to other people as well. The brain is a busy place and it's always producing ideas. Some ideas that come this way are pretty weak but a few are good.

It may help you get ahead if you can pin down these fleeting ideas, hold them within reach until you can take another look at them, and then discard those that are useless and develop those that are promising. A small pocket notebook on the job and a similar notebook beside your bed are helpful tools in catching these half-formed ideas. Your discards will run high but the ideas that are left may pay off. It's important, though, to get all ideas down on paper as they occur to you, or you may lose them altogether.

To show how inspired ideas sometimes can pay off, take the story of C. H. Snyder, president, Sunnyside Coal Co., Pittsburgh, Pa. Watching the chipping heads of his strip-mine overburden drills one day some years ago, he asked himself, "Could we use a bigger chipping head underground to break coal continuously off the face?"

He didn't let the idea slip away from him. He held on to it, worried it into shape, and at last, late in 1948, produced the first of a new type of machine for continuous mining.

Granted, things like that don't happen often. As an experienced anthracite man said a few weeks ago, "Ideas must be developed to be worth while. Only a few spontaneous ideas can be used." Along the same line, a Pennsylvania bituminous producer said, "Sometimes, of course, an idea and a practically perfect solution does pop up, but this is quite unusual."

But it does happen sometimes, as Mr. Snyder's experience shows, that you can produce an idea without having a definite problem, like a transportation bottleneck, and without consciously starting out to solve it. Mr. Snyder got his idea before he actually defined a problem. It came in a flash and wasn't hard to produce. The real job was to make the idea workable. That took some years.

3. Getting ideas by direct transfer or adaptation.

Sometimes you don't have to think up your own ideas. They come to you ready-made from other sources and all you have to do is put them to work on your own property, either without change or with some adaptations.

That's not always as easy as it sounds. To get ideas from other sources, you have to stay alert and in touch with the sources of ideas.

What are these sources of ideas? They include the following:

1. **Visits to other mines and other industries**—As a wide-awake Pennsylvania operator put it recently: "We very often develop ideas from sources outside our own organization. These are generally from people at other mines and from mine visits as well as contacts with other industries."

For example, during a visit last year to the Lake Creek mine, Consolidated Coal Co., Johnston City, Ill., the district superintendent of a nearby company saw the new track-brake man-car built by Consolidated and described in *Coal Age*, Sept., 1949, p. 88. He carried the idea back home with him, built a similar car for his own operations and thus added to the safety equipment already provided for his miners.

That's what can happen when you visit around in your own industry. A good many coal men, however, don't limit their search for ideas to coal operations. They also scout other industries and bring home useful ideas. For instance, a troublesome water inflow at the new mine of Alpha Coal Co., Alpha, Ill., was stopped by a chemical sand-solidification process that had been used in the building industry for nearly 10 yr in the United States and for even longer in Europe (*Coal Age*, July, 1949, p. 78). Likewise, some of the processes now used in coal preparation have been adapted from the ore-dressing industry. And roof bolting, now one of the "hottest" developments in coal mining, entered the industry from the metal mines in the Southwest.

It should be pointed out, by the way, that visiting works both ways. That is, if you expect other coal men and men in other industries to share their ideas with you, you should be willing to share yours with them. With competition from other fuels pressing in on coal, a coal man can ill afford to lock up his secrets within his own company.

Beating competition from oil and gas is a teamwork job in which the whole industry has a stake and a share of the responsibility. Whatever helps one coal company beat competition helps the whole industry.

2. Professional, technical and association meetings—It pays to get around. A good place to go in search of ideas is a meeting with other coal men, where you can profit by hearing their experiences in mining and its related problems. The chances are that you'll pick up some useful idea that you can transfer directly, or with some adaptation, to your own property.

Don't overlook the equipment manufacturers who attend coal-mining meetings. They, like you, are in the idea-producing business. They may be able to help you with an idea and, what's equally important, you may be able to help them. As a Missouri producer said recently, "I believe you will agree that nearly all industrial equipment today is a result of evolution through the ideas of operating men. Putting these ideas into practice has gradually brought equipment up to today's high standards."

If you can't attend meetings, the next best thing is to read reports of meetings in *Coal Age*. These reports, staff-written by *Coal Age* editors, give a full account of papers, addresses and discussions at coal-industry meetings.

3. Industry magazines—There's so much going on in coal mining today that it's dangerous to rely altogether on your own knowledge to keep you abreast of progress. A good way to widen your knowledge and collect new ideas is to read good magazines about coal mining. They'll save you time and travel because the editors do your traveling and your idea-collecting for you.

The information in a coal-mining magazine—*Coal Age*, to mention the one we know most about—comes from (1) the editors, who travel about 75,000 mi per year in search of new methods, new equipment, new machines and better ways of mining and preparing coal; and (2) experienced operating men, technicians, engineers, equipment manufacturers and outside authorities who, usually at the editor's request, write about their new-found ways to mine and prepare coal.

The editors sift all this information, boil it down and rewrite it so you'll get the most value for the time you spend reading *Coal Age*. To help you get through it fast and profitably, they spot the key points

in every article with big, black type and spread headings and subheads throughout the text. To help you quickly visualize the methods and equipment described, they throw in plenty of photographs taken on the spot and as many drawings, flow-sheets and data sheets as may be needed to explain an operation.

Finally, the editors arrange the material in departments so you can find what you want quickly. These departments are as follows:

Editorial feature section—Full-length articles with ideas on up-to-date and unusual operations in anthracite and bituminous, deep and strip mining, preparation, maintenance, power, safety, training and the broad issues and problems that affect the industry generally.

Operating Ideas—Short, fast-moving how-to-do-it articles with ideas about using methods and machines to obtain higher efficiency.

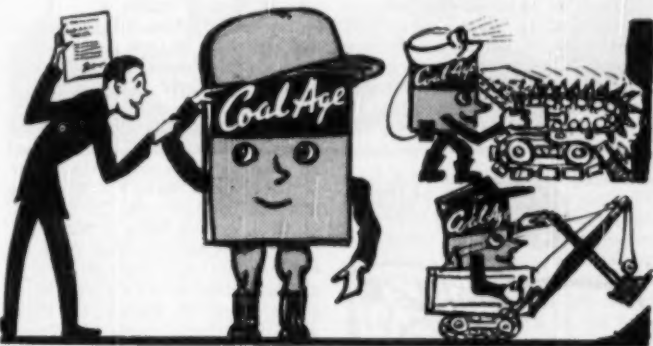
Equipment News—What's new in machines, tools and materials,

with manufacturers' notes on their application to coal mining and listings of catalogs and bulletins available on request through *Coal Age*.

Foremen's Forum—Practical ideas on dealing with men and cutting accidents.

News Round-Up—Reports from the labor front locally and in Washington; promotion and personnel changes among the men you know; new mines and preparation plants under development or contracted for; announcements of new "permissible" approvals by the U. S. Bureau of Mines; association announcements; new books and printed reports holding special interest for coal men; and, as pointed out earlier, full accounts of the meetings of professional, technical and business associations.

Advertisements—Where equipment manufacturers join coal producers and editors in revealing new ideas for making coal mining faster, cheaper and safer.



How to Put Coal Age to Work for You

HOW CAN YOU GET THE MOST out of a coal-mining magazine?

Here are some recommended steps that will help you get more ideas out of *Coal Age*:



1. Take a look-through when the magazine first reaches you—That's how an anthracite operator starts out. "I take a quick glance and spot what I want to read and study," he explains.

A western Pennsylvania operator goes about it much the same way. "My first step in looking at an issue of *Coal Age*," he reports, "is to thumb quickly through it all, making notes of material that I want to go back and look at closely."

Start your look-through with the contents page. That's always p. 5. It tells you very briefly what's in the issue. Then thumb through the copy, reading the article titles and headings, which always are in bold,

There's Tricks to Every Trade—These Suggestions for Using COAL AGE . . .

black type at the start of each article. As you go, take a look at the pictures and the captions beneath them. The headings and pictures tell you quickly what each article is about, what the problem was, how it was solved and what the results were. As you turn the pages, mark the articles you want to come back to. A turned-down page corner will do the trick.



2. Go back and give a careful reading to the articles you marked—Underline or score the particular sections in each article that interest you, either as a help in a problem that you now have or as a possible help in some future problem, when you get a promotion or move on to another company.



3. Keep your eyes open for articles, information, methods and equipment that will help you in your present job—In *Coal Age*, you'll find mine and plant descriptions, preparation data, operating helps, equipment uses and tips on labor and public relations. There's something in *Coal Age* for every man, from foreman right up to the president of the company. That means you'll find something useful if you've already reached the top. If you're still on your way up, *Coal Age* can give you a boost.



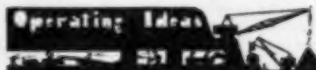
4. Look for ideas—To give you an idea, an article doesn't have to be about a mine that's a close neighbor of yours or exactly like yours. The ideas in *Coal Age* come from all over the country. Granted, conditions differ between one mining field and the next, between one seam and another, and even between two mines in the same seam. Granted also that not every idea used successfully in southern Illinois, for example, will work equally well in West Virginia.

Yet lots of ideas, either as they are described in *Coal Age* or with only slight changes, will work well almost anywhere. A little over a year ago, for example, C. W. Corbett, general manager, Rimersburg Coal Co., Rimersburg, Pa., installed an electric dump crane that eliminated truck hoists at his strip mine and cut haulage costs 20 to 25% (*Coal Age*, May, 1949, p 102). Mr. Corbett adapted his idea from an earlier *Coal Age* description of a similar set-up at the Cutshin mine, Cutshin Coal Co., Wooten, Ky. From a Kentucky truck mine to a Pennsylvania strip mine—that's a long jump for an idea but the idea was as useful in one field as in the other and as useful at a strip mine as at a truck mine.

Naturally, the ideas in *Coal Age* aren't limited to actual mining operations. To keep top men informed and to provide ideas for men who want to move up to the top, the lead-off feature article each month usually is a discussion of some broad industry problem or development, such as marketing and competition, growth possibilities for the industry, laws and regulations affecting coal, contract negotiations, public relations and industry-wide advances in research.

These broad industry-coverage articles won't help you actually mine coal, but they will keep you up to date about questions affecting your company, your job and

your future. The company that moves ahead is the one that gears its operations to economic, industrial, research and labor developments, long-term and short-range. And the man who moves up within his own company is the man whose ideas are based on sound information that reaches beyond the narrow limits of his own job. These articles on industry problems will ready you for a bigger job.



5. Look at the departments—As described earlier, the departments are made up of short, pointed write-ups, mostly with photographs, in which each idea stands out by itself. Writing recently about how he uses these departments, a Pennsylvania bituminous engineer said, "I sometimes send the articles or comments on them to some of our operating people and sometimes utilize the ideas in our general planning."



6. Mark or cut out articles of special interest and pass them on to your associates for study or action—This works both ways—from the top down, when an executive spots an idea he thinks might be useful and asks for a follow-through down the line; and from the lower levels up, when a fore-

Will Save You Plenty of Time and Effort in Getting Good Practical Ideas

man finds an idea he wants to put across up the line.

If you don't want to cut up your own copy, *Coal Age* usually can provide, without cost to you, a few tear sheets of the article you want. If you want a number of copies, reprints can be made up especially for you at reasonable cost. All you have to do is let the editors know what you want.



7. Keep a file of back issues of *Coal Age*, or cut out and file articles that you think may be useful to you in the future—That way, you'll pin down some of the ideas that might escape you otherwise. If you make a file of cut-out articles, it's a good idea to make a subject index for them to help you find what you want when you want it. If you file complete issues of the magazine, the monthly table of contents is a useful index until the end of the year. At the end of each year, *Coal Age* will provide you with a whole year's index if you ask for it.

Here's how some *Coal Age* readers handle back numbers of the magazine. A West Virginia operator binds his back issues into a single volume at the end of every year. This gives him, he reports, "the best library on coal mining I have. I have always found in the various volumes some discussion of the numerous problems which arise in operating a coal mine."

A western Pennsylvania operator, on the other hand, doesn't file back issues or bind them. He explains, "I cut out articles of special interest in *Coal Age* and other technical magazines and file them for future use. I don't keep old issues of *Coal Age*, having removed articles of special interest."

And an Indiana operator, asked if he filed cut-out articles or kept back issues, replied, "No. Wish I did."

8. Give the advertisements a good going over—"Yes, I do pick up ideas from the advertisements," said a Pennsylvania bituminous producer when asked if the ads helped him. Other operators, asked the same question, agreed. A Missouri producer pointed out that the ads often contain the germ of an idea that can be developed, adapted and put to use by his company.

The fact is, the manufacturers work hard to make their ads helpful by telling you what their product is, how it works and what it will do to boost efficiency and keep costs down. That's why you may be missing some good ideas if you skip the ads.



9. Use *Coal Age* in your staff conferences—A good many coal men find *Coal Age* helpful in solving some of their problems in staff conferences. Whether your problem is transportation, face preparation, power, drainage, labor relations, ventilation, safety or any one of many other aspects of coal mining,

Coal Age very likely has published something that will help you. To find what you want in years past, look in the annual index, which you can obtain free simply by asking for it at the end of the year. To find what you want in issues for the current year, turn to the contents page (p 5) of each issue.

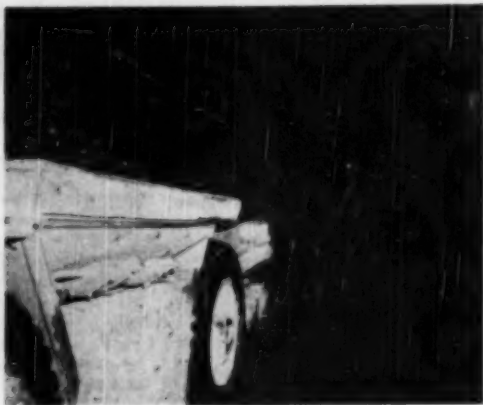
10. Write to the editors—Maybe the editors can help you with an idea that will ease your problem. They may know about an article that you missed or forgot—one that

will answer your question. They can point it out for you. Or they may know about another mine with a problem like yours and thus may be able to bring you and another coal man together in a search for the answer.

Writing to the editors will help the editors also. If you tell them what your problems are, they can steer their editorial search in that direction and perhaps come up with an answer that will guide you and others toward promotion for yourselves and higher efficiency, lower cost, better quality and greater safety for your company and the industry. It's the editors' job to seek and report the answers to your operating problems. They'll sincerely welcome your letters.



Knight Mine—Carefully Tailored to Its Operating and Market Conditions



MINING MACHINE (left), with hydraulic drill, prepares as many as 10 places per shift. Dual tires are to be added to drive wheels to improve traction on 10% pitch. Crawler-mounted loading machine and cable-rope shuttle cars operate efficiently in this high coal. Belt conveyors, 36 in wide, are main haulage medium at Knight mine.



STEEL-CONCRETE-TIMBER BIN is fed by slope belt. The bin is built into the canyon wall.

FEEDERS at bottom of bin load 18-ton trucks in 2 min for the 15-mi trip to screening plant.



WINCH-LIFT TRUCK pulls trailer wheels toward tractor wheels, thus raising body.



MAIN SLOPE BELT, 36 in wide, is installed in the center slope heading. Shuttle cars discharge to the end of the belt, which carries the coal to a 700-ton bin at the mine opening. As shown in these views, all openings are rock-dusted to within 40 ft of the face by a portable high-pressure rock-dusting machine.

How Knight-Ideal Coal Co. Uses Flexible Plans and Methods for . . .

Thick-Seam Mining in Utah

Quick Production at a High Rate Eases Amortization Problem—Adequate Pillars, Left in Place, Assure Good Protection for Main Openings — Weather and Market Fluctuations Influence Plans and Operation

TAILORING the planning and early development of Knight mine to fit seasonal fluctuations in demand for their domestic and commercial fuel, W. W. Clyde, president, and C. A. Carlson, general superintendent, Knight-Ideal Coal Co., Wellington, Utah, apply mechanical mining units to entry-development in warm weather to permit higher production in cold weather from the room-and-pillar sections established by such development.

Opened in June, 1949, Knight mine produces from the 9-ft-thick Gilson seam from openings in the wall of Coal Creek Canyon, 15 mi north of Wellington. Production averaged 10,000 to 11,000 tons per month in the first year of operation.

The mining system adopted provides for reasonable retirement of the equipment investment through high early production, while assuring protection for the main openings throughout the life of the mine by leaving adequate barrier and

room pillars to prevent squeezes.

• The main openings at Knight are (1) a five-heading slope entry driven down the full 10% dip of the seam and (2) a five-heading butt entry on the strike. Early development was concentrated on driving the butt entry to the west a sufficient distance to permit rooms to be turned off before cold weather arrived. As shown on the mine map, this meant driving the west entry far enough past the slope projection to provide a 100-ft barrier pillar between the slope and the first room. The barrier pillar, reinforced by pillars in the first three rooms, will protect the slope for the life of the mine.

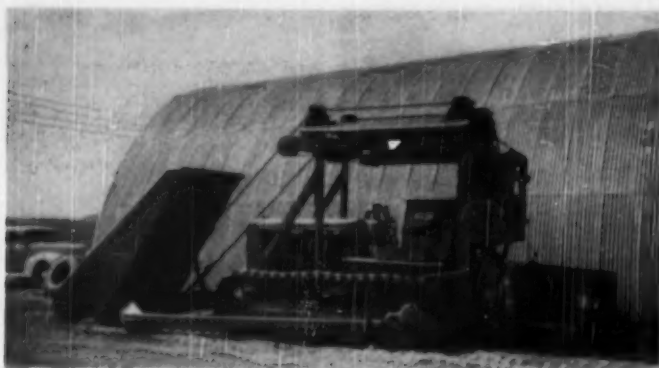
With the advent of warmer weather in the spring, work in the west entry and rooms was stopped and development of the slope was begun. The slope must be developed in warm weather because at this early stage the mine is not deep enough to assume a constant above-

freezing temperature. Seepage would freeze at the face of the slope in winter, thus preventing efficient pumping. Also, production from slope development does not satisfy the company's market for domestic fuel on top of the year-round demand for commercial fuel.

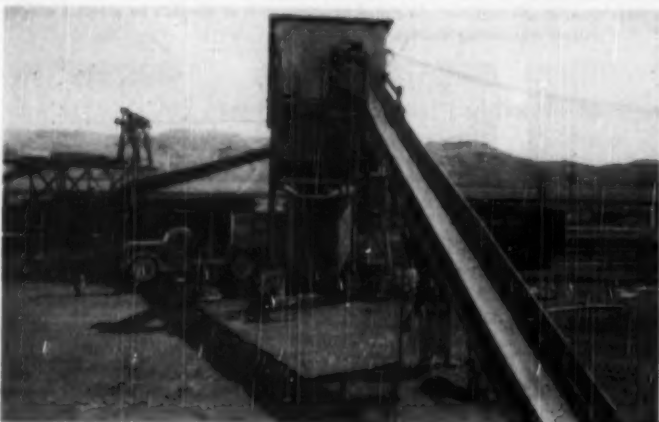
• Seven men operate the underground equipment at Knight. The crew consists of an operator for the Joy 11BU loading machines, operators for two Joy 10SC shuttle cars, an operator and helper for the Joy 10RU mining machine, a mechanic and a bratticeman. In addition to his stopping duties, the bratticeman uses an MSA high-pressure rock-dust distributor to keep openings dusted to within 40 ft of the face in compliance with Utah mining laws.

The Joy 10RU mining machine has a 9-ft cutter bar and is equipped with a CD-23 hydraulic drill. The cut is made about 3 ft above the bottom to eliminate shoveling of cuttings. A 2-in binder 3 ft from the top is the only impure streak in the seam. In the slope headings, the mining-machine operator and his helper prepare all five places for loading on their night shift, except at those times when deep crosscuts add materially to trimming and cutting time. Kennametal bits are

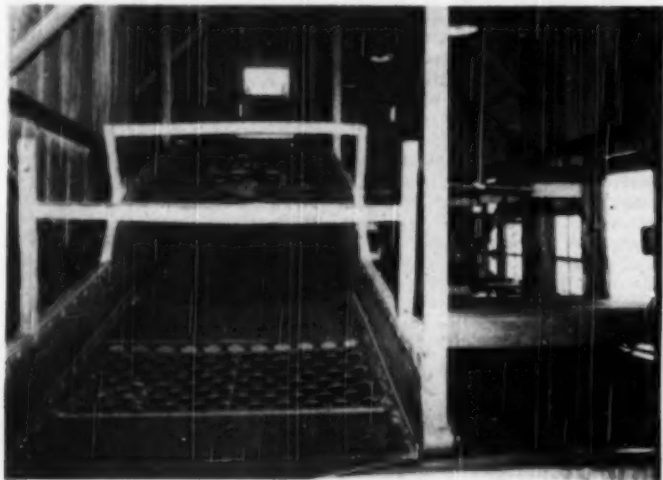
Compact Screening Plant Produces Wide Range of Sizes



FRONT-PICKUP, rear-discharge loader on tractor with padded tracks puts coal in plant-feed hopper.



SCREENING PLANT features flexibility. Four track-booms and truck-loading facilities for all sizes are provided.



SCREENS are quickly removed and replaced by others as demand for certain sizes fluctuates.

used for drilling and Bowditch A-2 bits for cutting, but the extreme hardness of the coal still makes frequent bit changes necessary. Usually each place requires a change of bits.

Illinois permissible explosive, in 1 1/4-in sticks, is used to charge the drillholes. Four bottom holes are shot first, then eight top holes are shot.

The transportation medium in the slope is a 36-in-wide 450-ft-long LaDel belt. The shuttle cars discharge to the end of the belt and the belt discharges to a 700-ton bin at the opening.

Set-Up for Year-Round Work

● For the coming winter, the mining unit which was driving the slope headings in warm weather has returned to the rooms off the west entry. It is driving rooms up the pitch from the entry and immediately extracting pillars in all rooms except the first three, as noted. In retreating, rooms will be driven down the pitch and pillars brought back, starting at the face of the entry.

An additional mining unit, now in service, is advancing the west entry to keep development ahead of room work. It also consists of a loading machine, mining machine and two shuttle cars. A 600-ft-long 36-in-wide belt is installed in 3 West. It discharges to the slope belt.

The two mechanical mining units provide Knight-Ideal with maximum flexibility in satisfying the peaks and valleys on their market-demand chart and in continuing their slope and room-entry development.

Future room entries will be turned off the slope on 550-ft centers. Rooms will be 250 ft long on both sides of the entries, thus providing a 50-ft barrier pillar between sections.

Large Trucks for Long Haul

● The run-of-mine product is dropped from the slope belt into the 700-ton bin constructed of steel, concrete and timber. The foundations of the bin are set in the canyon floor and the body of the bin is built into the canyon wall between the floor and the mine opening. The front and sides of the bin are constructed of 3x8-in planks on a supporting frame of 10-in steel H-columns and steel bracing. The sloping bottom of the bin is made of concrete laid on the canyon wall.

Two feeders at discharge gates at the bottom of the bin load trucks for the 15-mi haul to the screening plant at Wellington. The four haulage trucks are 18-ton International tractor-trailer units with Winch-Lift dump bodies made by the Winch-Lift Trailer Co.

In good weather each truck makes seven round trips per day, but at the time the operation was visited, each unit was making five trips because slope development required only that amount of haulage.

Knight-Ideal road patrols maintain approximately 10 mi of the haulage route between the mine and screening plant. Only on rare occasions has wet weather or snow interfered with haulage.

Tractor-Loader Feeds Plant

• The trucks dump the coal on the ground for natural drying at the screening plant. When dry, it is picked up by an Austin Overshot loader mounted on a D-6 Caterpillar tractor and dumped into a 50-ton plant feed hopper. The Overshot loader picks up coal in front of the tractor and discharges it at the rear. Therefore, the tractor does not turn in the coal storage area, but shuttles back and forth between coal pile and hopper. In addition, pads on the tracks prevent mixing of dirt and coal. A Cedar Rapids reciprocating feeder at the bottom of the hopper transfers the coal to the 36-in plant-feed belt.

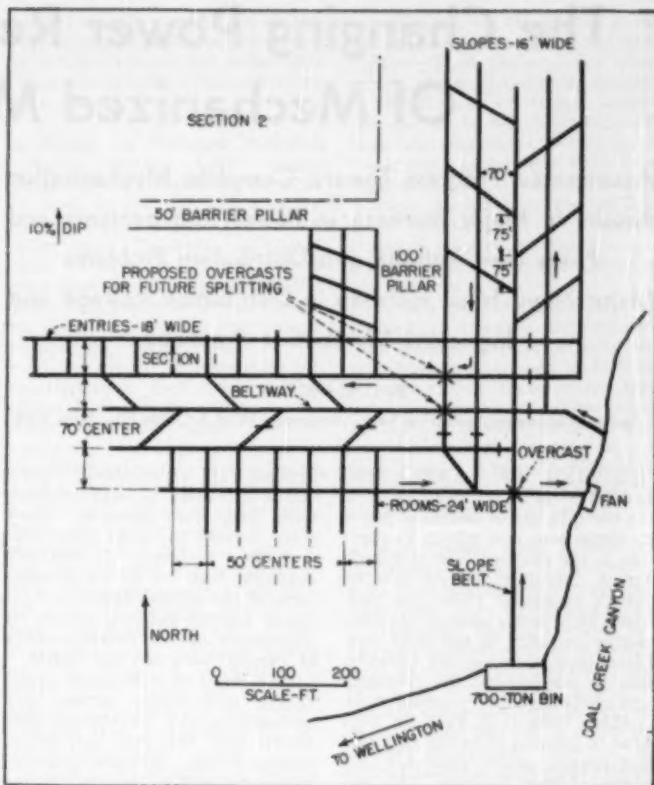
Layout Provides Flexibility

The belt discharges to shaking screens which produce sizes from minus 3/16-in dust to 10-in lump. All screens can be quickly removed and replaced by others of different size if demand warrants this change.

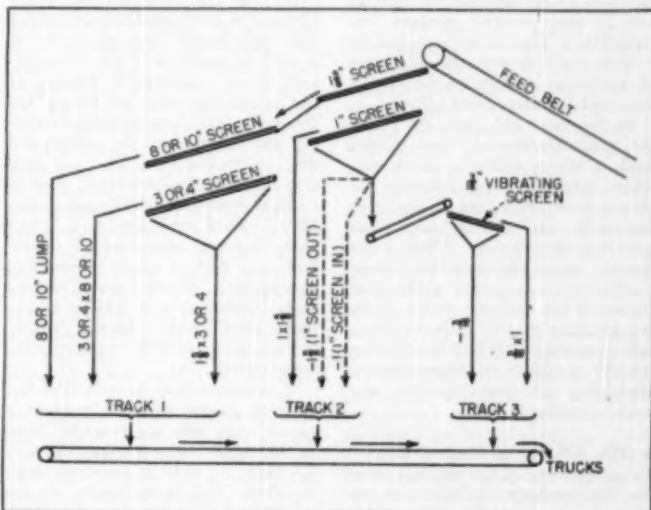
Three loading booms serving three loading tracks, plus a truck-loading cross-conveyor, are provided in the design of the plant. Any of the loading booms can be raised to place coal on the cross belt that discharges to a truck-loading chute.

The arrangement and interchangeability of the screens in the plant make it possible to produce the following sizes: 3/16-in dust, 3/16x1 stoker; 1-in stoker-slack; 1½-in slack, 1x1½-in; 1½x3 or 4, depending on screen set-up; 3x8 or 4x8; 3x10 or 4x10; and 8- or 10-in lump.

The flexibility of the mine and screening plant permits Knight-Ideal to take care of its customers' needs with a minimum of strain.



INITIAL PLANNING at Knight mine recognized the need for high early production without jeopardizing future operations. Well-planned projections are closely followed in matching the mine to its market and in maintaining maximum efficiency.



PLANT LAYOUT illustrates the flexibility that is characteristic of Knight-Ideal operations in both mining and preparation.

CLOSER APPROACH to complete mechanized production requires action on...

The Changing Power Requirements Of Mechanized Mining

**Accelerated Progress Toward Complete Mechanization
Results in Major Increase in Power Requirements and
Poses New Voltage and Distribution Problems
Major Need Is an Increase in Distribution Voltage and
Improved Distribution Practices**

By C. B. PECK JR.

Assistant Manager, Industrial Sales, Anaconda Wire & Cable Co., New York

"GROWING IN LEAPS AND BOUNDS" is an apt description of the trend in use of electrical power by bituminous coal mines. Younger men in the electrical end of mining find it difficult to believe that by today's standards there was relatively little power used by the coal-mining industry in the early 20's. Likewise it stretches the imagination to comprehend the consumption needs immediately ahead of us.

About 1900, C. B. Peck Sr. built what is believed to be the first central electric power plant for coal mining in West Virginia. This was at Riverside, in the Kanawha Valley immediately east of Charleston. As an incentive for the nearby mines to convert to electricity, a flat rate of 2c per ton for cutting and 1c per ton for haulage was established. The locomotive and the cutting machine were the only types of electrical equipment in service then and for some time after.

In the later 30's and early 40's the mechanization of coal mining made a major advance. Such electrical equipment as loading machines, post drills, big locomotives, conveyors and shuttle cars came into widespread use. This rapid change made the existing power-distribution systems inadequate. Undervoltage was the order of the day in many mines. This was a result of adding new and larger electrically operated machines without expanding power-distribution systems accordingly.

● **The Effects of Undervoltage**—As an example of the magnitude of the undervoltage condition, it was estimated at that time that nearly half the trailing cables in service failed to reach their life expectancy

because of overheating. Since cables were made of natural rubber, cable fires were common. These were claimed to cause mine fires and other accidents. It was this condition that led to the development of the present flame-resistant cables and the flame-resistance requirements of the Commonwealth of Pennsylvania and the USBM.

As a result of widespread undervoltage most mines became very voltage-conscious. Substations were moved near the face and larger feeders added. Portable rectifiers were introduced to keep up with the rapidly advancing face. These and other voltage-regulating measures greatly improved the situation by the end of the war.

In 1946 and 1947 another major advance in mechanization got under way and, except for a pause in '49, is still in progress. This was a result, to a considerable extent, of the increasing scale of wages for the coal miner. Coal companies simply had to increase the output per man or show a loss. The only way this could be accomplished was to further mechanize their operations. Mines where conditions had, in the past, favored semi-manual operation now had to go to mechanical equipment. Shuttle cars became more common, and newer equipment, such as drill trucks, timber setters and portable compressors, were added.

It is interesting to note that the kilowatt hours required to mine a ton of coal took its greatest jump in this period—from approximately 6.5 kwhr in 1946 to nearly 9 kwhr in 1949. The latter figure is approximately double that for 1920, when less than 4.5 kwhr was used to produce a ton of coal.

● **Increased Load Poses New Distribution Threat**—Today, we are faced with the same undervoltage situation all over again. The greatly increased load, plus the introduction of the various continuous mining machines, again threatens the existing power-distribution systems. It is believed that some mining men do not realize the tremendous power demand the continuous machines will impose on their distribution systems. A leading consulting engineer has estimated that a mine using such machines throughout would nearly double electrical power requirements at the face.

As an example of the problem ahead of us, the writer recently saw the charts taken from a recording voltmeter and ammeter attached to one of the 250-volt dc machines. In a 10-min cycle there was one peak of 1,200 amp, and five peaks of 900 amp or higher. The average was approximately 300 amp. The voltmeter at the machine showed a voltage of only 100 at the time of the 1,200-amp peak and an average, during the 10 min, of about 150.

While this probably is an exaggerated case, there have been reports of cables destroyed by overheating in sections where continuous miners were installed. As a result, miners are now being equipped with trailing cables that are over 2 in in diameter and weigh more than 4 lb per foot.

It is not only inside the mine that power requirements are expanding. The newer preparation plants are becoming more like good-sized factories. It is not uncommon to see one requiring nearly 400 electrical motors to operate it.

● **Old Systems No Longer Adequate**—Constant increase in power demands have brought about a situation where conventional distribution systems are no longer adequate. The old system was composed of fixed motor-generator or rotary-converter stations, either above- or belowground, with the trolley wire supplemented by bare copper feeder cables supplying power to the working face.

When the stations were above-ground, dc cables were dropped to the workings below through bore-

holes. Stations in the mine commonly received 2,300- or 4,160-v ac power through borehole cables from overhead lines on the surface. This system was not very flexible and entailed a considerable expenditure to move the substation. In mechanized mines, the faces advanced so rapidly that often distances to the substations became too great. Therefore, in spite of 400,000-cir mil trolley wires and 1,000,000-cir mil feeders, voltage drop was too high.

The introduction of the rectifier in the late '30's helped materially since it could be moved with less time and expense. The more recent portable rectifier substation is another improvement. This latter, fed by semi-portable high-voltage mine power cables, is very flexible and permits the station to keep pace with the face.

Equipment is getting so large and the power requirement so great, however, that for many of the larger mines the portable rectifier is not the complete solution. It is rapidly becoming apparent that higher voltages must be used. Some mines have reached the economic limit in the size of their copper cables.

● Economic Limit Controls Cable Size—A feeder cable larger than 1,000,000 cir mil usually is uneconomical. In larger cables, the current-carrying capacity does not increase in direct proportion to the copper added. In other words, a 500,000-cir mil cable will carry considerably more than half the current carried by one of 1,000,000 cir mil. This can be determined by comparing the current ratings, at 30 C ambient temperature with a 45-deg rise, for 500,000-, 1,000,000- and 1,500,000-cir mil bare-copper cables. These are approximately 800, 1,230 and 1,550 amp, respectively.

This same principle applies to the insulated trailing cables and high-voltage ac feeder cables as well, except that the economic limits are reached with a much smaller copper size. This reflects the fact that they are multi-conductor cables with a protective jacket over the conductor assembly.

With trailing cables, weight and diameter become factors as well. Men have been heard to complain of the difficulty of handling cables on the continuous miners, some of which, as pointed out earlier in this article, now exceed 4 lb per foot. For a 300-ft cable, which is about the minimum length used, the

weight would exceed half a ton. The diameter also is so great that it is difficult to coil the excess cable when the machine starts working in a place.

● Higher AC Voltages Proposed

—Until recently, 5,000-v cables have been the accepted standard for ac mine distribution. In some instances, these cables are several miles long. To overcome voltage drop, cables up to 4/0 in size have been used. A cable as large as this is hard to handle as a result of its diameter and weight, particularly in the lower coils.

To get smaller, more-efficient and less-expensive equipment, a few mines have bought cables in the 7,000- to 8,000-v range. And recently the chief engineer of one of the larger companies stated that in view of the projected electrical load at his mines, all power cables would be in the 15,000-v class. He estimates that in a few years most of the larger mines will be forced to this voltage unless they are prepared to run several parallel circuits made up of 5,000-v cables. While this seems obviously true, a word of caution is in order: 15,000-v cables must be installed, spliced and terminated much more carefully than is customary for the conventional 5,000-v cables.

There is apparently no restriction by the various inspection authorities on the voltage limit for primary mine-power cables. However, there are a few restrictions on the installation and construction of these cables by some states and the Bureau of Mines. Most states, and the Bureau, now permit the rubber-insulated neoprene-jacketed cable, which is less expensive, lighter and easier to handle than the old metallic-armored type.

This construction is by far the most commonly used. However, it is recommended that each conductor be shielded and that grounding wires be included.

The cable is about half the weight and much more flexible than the armored type. It is not subject to electrolysis as was its predecessor, and can be moved much more easily. This latter feature is desirable when used with a portable rectifier.

● Trailing Cables A Major Problem

—Much more serious is the voltage problem with trailing cables and feeders. In spite of the need for higher voltages on these cables, particularly when ac is used, most states prohibit voltages in excess of 300. There are a few mines

on 500 v dc, but these were in operation before the regulations were written. There also are a few mines using 440 v ac with special permits.

The Bureau of Mines permits voltages up to 800 v but the state laws take precedence. There is not much that can be done until these regulations are modified. Toward this end, the American Mining Congress Committee on Underground Power is preparing a paper to present the facts favoring 440 v ac and 500 v dc.

To help meet the problem, some mines have developed network systems modeled after the distribution systems commonly used by utilities in large cities. These consist simply tying the feeder cables in one section with those in another. This has the effect of throwing an unusually heavy load onto more than one substation, thus reducing the voltage drop in feeder cables.

● New Trends Mark Feeder Installation

—A trend is developing towards insulated feeder cables and away from bare conductors. This is especially desirable when belt haulage is used or when a section is to be worked out quickly. These cables, which have 600-v rubber insulation and a neoprene jacket, can be laid along the rib without the expense of racking them on insulated bolts. If the copper stranding is made a little more flexible than the standard bare feeder, the cable can be easily rolled up and relaid elsewhere. While the initial cost is greater than bare feeder, increased mobility and ease of installation offset the higher price.

A number of mines are installing connectors at set intervals so that the cable can be plugged or unplugged with a minimum of delay. These feeders usually terminate in junction or distribution boxes at each section so that the trailing cables of the face equipment (which also have connectors) can be plugged into the power circuit quickly. This system has the added advantage of permitting replacement of a damaged cable with a minimum of delay.

From the foregoing, therefore, it can be seen that the rapid approach to complete mechanization brings about the necessity for a modern power-distribution system. There naturally are many problems growing out of varying local conditions but, basically, adequate voltage at the face and sufficient mobility to keep pace with the speed of mechanized mining are the major features to be kept in mind always.



REBUILT ELECTRIC SHOVEL with 20-cu yd dipper strips up to 60 to 65 ft to uncover 40 to 42 in of coal. Some 15 mi of outcrop is available for mining.

The Buffalo Creek Story

To Profitably Mine 15 Mi of Outcrop, United Electric . . .

Rebuilds shovel to add 20-yd dipper

Strips 60- to 65-ft overburden in recovering 40 to 42 in of No. 6 coal seam

Maintains good 60-ft-wide roads, employing stepped principle to favor diesels

To Produce Quality Stoker and Carbon, United Electric . . .

Uses launder-type washer for primary cleaning and tables for finer sizes

Crushes raw coal in four stages

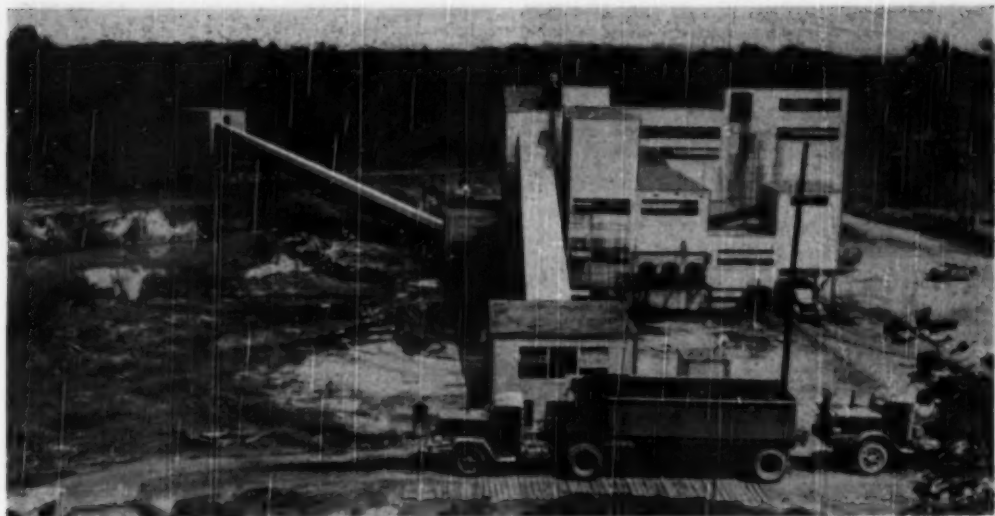
Dewaters and dries with vibrators and centrifuges and oil-treats all sizes



SET UP to ship stoker and carbon—washed, dried, precision-sized and oil-treated—the new Buffalo Creek No. 19 mine of the United Electric Coal Cos., St. Charles, Ky., backs up quality preparation of Kentucky 6th Vein coal with a 20-yd shovel rebuilt for contour stripping up to a depth of 60 to 65 ft.

Daily production, shipped over the Illinois Central and marketed under the Buffalo Creek trade name, is approximately 2,000 tons. Mine operations are under the direction of R. F. Donaldson, superintendent; Glen Canada, pit foreman and master mechanic; Oscar Ernst, chief electrician; J. O. Russell, washery foreman; J. C. Morris, storekeeper; W. W. Curtis, mine clerk; Ivan Berry, chemist; and James Reid, mining engineer. The preparation plant was designed by Ned Dress, United Electric chief master mechanic and designer, and was built by the United Electric working force.

AFTER CLEANING IN THE PIT, coal is loaded into 33-yd semi-trailers by a 3½-cu yd electric shovel.



PRODUCING ONLY STOKER AND CARBON, the Buffalo Creek preparation plant features stage crushing, washing in launder and table equipment, and bin storage and loading, with oil-treating of all sizes, through a separate two-track loading plant.

Contour Stripping to 65 Ft

Average thickness of the No. 6 coal being stripped at Buffalo Creek No. 19 is 40 to 42 in. It contains, in places, a "dirty band" varying from a fraction of an inch up to a parting separating the seam into two splits. Up to 15 mi of outcrop constitutes the reserve, which is divided by stream valleys into three major areas. These are being mined by stripping around the hills to the maximum depth of 60 to 65 ft of overburden that varies from place to place.

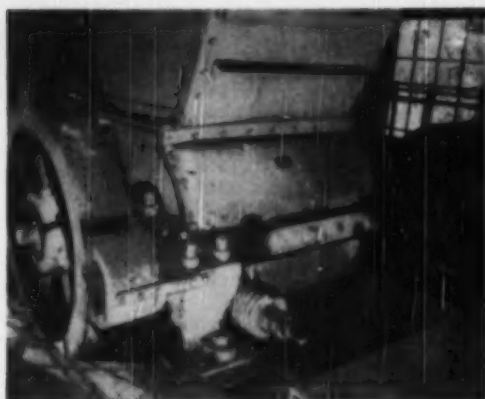
● The coal outcrop is not exposed and is cut off at a point where the overburden is 10 to 15 ft thick. Box-cutting normally involves rock for at least part of the cut, which must be shot. In such box-cutting, the practice is to drill one or two holes ahead a maximum depth of 72 ft and then shoot to establish the highwall line. Depending upon the slope of the hill, the number of cuts 50 to 60 ft wide taken before the stripping limit is reached varies from 2 to 20 or so.

The overburden varies in nature. Top soil and hard pan is thin to practically non-existent. As a rule, the coal is overlaid with a hard blue shale. Sometimes this shale extends all the way to the surface. Normally, however, thickness of the shale is 30 ft or so. Above it, under what might be called normal conditions, is 30 ft or so of sandstone in a 60- to 65-ft bank. The lower part of the sandstone is light gray and extremely hard and tough. The upper part is a brown sandstone that is relatively soft and easy to break. On occasions, however, the sandstone

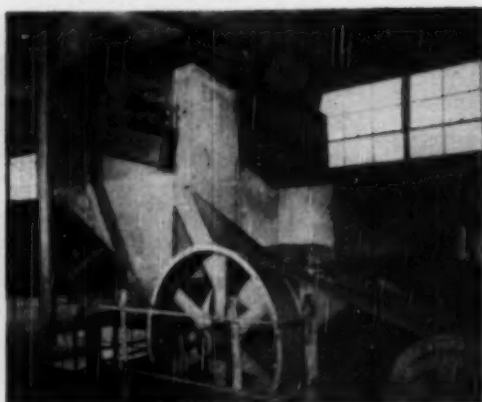


STEPPED CONSTRUCTION for better operation of haulage units features new section of the main haulage road. At the left, a haulage unit has just come down off a 10-ft step onto the level section leading to the next step.

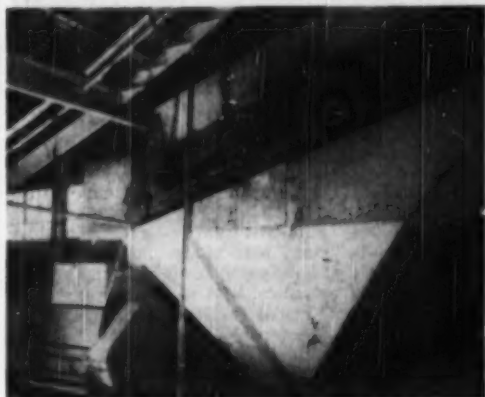
Buffalo Creek Stage Crushing Converts Mine Product to Stoker



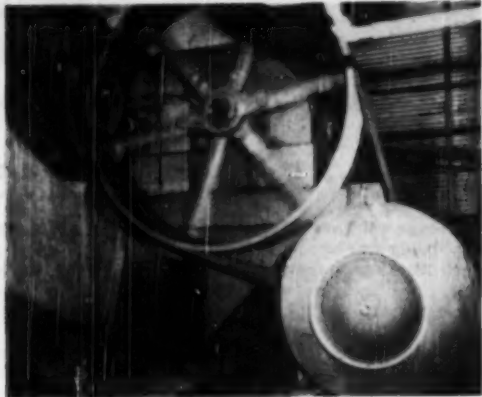
1 PRELIMINARY BREAKING to 6 in in separate crusher house.



2 SCREENING at 1 1/4 in and crushing of oversize to minus 3 in.



3 SCREENING at 1 1/4 in and crushing of 3x1 1/4 to 2 in.



4 SEPARATION at 1 in and crushing to minus 3/4 in.

comes down near to or onto the coal.

• **Stripping is done** by a Marion 5480 electric shovel rebuilt in 1946. When the shovel was originally purchased for use at an Illinois operation, it was equipped with a 12-yd dipper. Later, a 15-yd Amaco unit was installed, and in the 1946 rebuilding this was succeeded by a Marion-built Hi-Steel dipper with a rated capacity of 20 yd.

In the rebuilding, the position of the crowd was changed for greater thrust and the A-frame was strengthened. Boom length is 95 ft; over-all stick length is 68 ft; handle length is 63 ft 3 in; dumping height is 73 ft 9 in; and dumping range from center of rotation to lip is 103 1/2 ft. The stripping shovel is accompanied by a Caterpillar HW-10 rubber-tired tractor and bulldozer. Rubber-tired equipment is used almost exclusively on

the coal to avoid the breakage encountered with crawler units, since the nature of the coal is such that it is susceptible to such breakage.

• **Operating voltage** is 4,000 nominal, and power is supplied by a 2-mi pole line to a Westinghouse circuit-breaker and junction box feeding a 2-mi Type SHD Tirez ground cable, 1/0 shielded conductors, each with separate ground wire. This same system supplies, through a skid-mounted pit transformer unit, the 440-volt loading shovel and other electrically-powered pit equipment.

The trailing cable for the strip shovel is a Type SHD Tirez unit, also with 1/0 conductors. Trailing cables supplying the loading shovel and one of the overburden drills are Type G, Roebling and General Electric. The grounded-neutral protective system is employed.

• **Two overburden drills** are installed, both of the sidewall type. One is a Parmanco electric-powered unit and the other is a gas-powered truck-mounted McCarthy machine. While 6-in augers with Coalmaster and Parmanco tipped finger bits are normally employed, 8-in augers are used with the McCarthy unit in deep overburden to increase the quantity of explosive charged and insure good breakage at the back and along the highwall line.

Holes are drilled 50 to 60 ft deep with 21- to 27-ft spacing and, in normal burden, are loaded with 300 to 400 lb of du Pont 401 and 367-A powder in 5x16 and 7x16 cartridges, stemmed with pit material in Sealite dummy bags.

Water is not too much of a problem and is handled by 3- and 4-in Jaeger electric and gas pumps, pumping over the spoil through rubber hose with screw couplings.

● **Loading is done without shooting** with a Marion 490 machine with 3½-yd dipper. Cleaning ahead of the loader normally is done by a Caterpillar road patrol supplemented by hand shoveling. As a result, preparation plant reject is held to approximately 10%.

● **The haul to the preparation plant** eventually will be 7 to 8 mi, one way, and in preparation nine tractor semi-trailer units are on hand. Only six are used with the present haul of 2 to 3 mi. Auto-Car and Dart tractors are used, and all are being equipped with 200-hp Cummins NH diesel engines. Semi-trailers are Fruehoff 33-yd units with Sanford-Day drop-bottom doors. Goodyear and Goodrich tires are used.

Roads 60 ft or more wide are built. The subgrade is native soil. If placed when dry, wetted in and properly ditched, the soil is practically impervious to moisture. The running surface is ballast-size limestone dressed with No. 6 lime and compacted by the haulage units. The result is a smooth waterproof surface with no holes or depressions.

In a mile of new road built by a contractor, the stepped principle was employed. The drop is approximately 40 ft. Consequently, four steps of approximately 10 ft were installed, terminating, in distances of approximately 150 ft, in

level stretches preceding the next steps.

● **The stepped design** is recommended as most favorable for diesel-truck operation. On the uphill haul with loads, the haulage units can gather enough momentum in high gear on the level stretches to negotiate the steps without gear changing. Thus, long stretches of operation in low gear are avoided, as well as the overspeeding that otherwise would be inevitable in running downgrade.

Haulage units are serviced in a Butler steel garage with the necessary service tools. The garage is supplemented by a general supply house (wood frame with steel siding and roofing), a Butler steel heating plant, a mine office and laboratory, and a lean-to-type parts unloading and storage shed serving the preparation plant. Mobile maintenance and service equipment includes a Dodge Power Wagon for the use of the electrician, International Harvester maintenance trucks, two rubber-tired welding units, a water wagon made of a semi-trailer and a D-6 utility tractor, largely employed in clearing the way and moving power cables.

Communication between the supply house, mine office, washery and stripping shovel is facilitated by a Femco system utilizing the 4,000-volt lines as the carrier.

Preparing Quality Stoker

Since only stoker and carbon are shipped, stage crushing is a natural feature of the Buffalo Creek preparation plant. A laundertype washer is used for primary cleaning of the entire product and is supplemented by tables for recleaning of the finer sizes, which are dewatered and dried by vibrators and centrifuges. All sizes are binned and loaded separately or mixed as desired over one belt feeding a two-track loading plant. Oil-treating of any size or mixture is done in this loading plant. Fine refuse is pumped away after separation out in a rake-type classifier.

● **Rated at 350 tph** and, as previously noted, designed and built by the United Electric organization, the Buffalo Creek plant went into regular service early in January, 1950. Raw coal from the pit is dumped into a 100-ton hopper fitted with a two-speed reciprocating feeder. This discharges the coal to a short drag-type elevating conveyor feeding to a crusher house—the first step in the preparation cycle.

A 36x54 Jeffrey single-roll crusher in the crusher house breaks the mine-run down to 6 in and discharges it to the main feed conveyor—a Jeffrey unit with 30-in Goodyear belt operating at 750 fpm. This belt elevates the coal to the main preparation plant.

● **Stage crushing** to reduce everything to a top size of 1¼ in is the first step in the main preparation plant. Coal off the belt is screened at 1¼ in on a 4x16 Ty-Rock vibrator. The oversize goes to a McLanahan & Stone 24x24 single-roll crusher for reduction to minus 3 in. In the second stage, a second separation is made at 1¼ in on a 5x10-ft Gyrex screen, with the 3x1¼ going into a McNally-Pittsburg double-roll crusher for reduction to 2 in.

In the final stage, separation is made at 1 in on one 4x10-ft Gyroset screen, with the 2x1 going to a 24x42 McLanahan & Stone crusher for reduction to minus ¾.

All the coal produced in screening and crushing, with a top size of 1¼ in, is combined and elevated to a trough washer of United Electric design. Material from the first draw is retreated over the third draw. Material from the second draw is returned to the feed, and material from the third draw is run to the refuse bin.

● **Clean coal and water** from the washer are flumed to a triple-deck board-hung flexible-arm-driven classifying and dewatering screen 6 ft wide. With a 1-in-equivalent slotted screen on the top deck, ¾ on the second deck, and 3/16 on the bottom, the screen makes four sizes: 1¼x1, 1x¾, ¾x3/16 and 3/16x0.

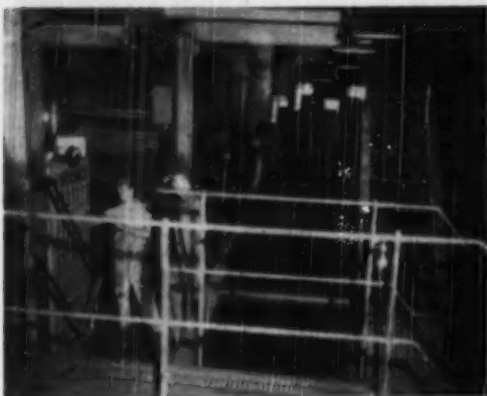
The 1¼x1 and 1x¾ go into their respective compartments of a two-compartment elevator, which lifts them to the Nos. 1 and 3 storage and blending bins, each with a capacity of 110 tons. A second conveyor lifts ¾x3/16 to No. 3 bin, also with a capacity of 110 tons. The 3/16x0 flows to a tank under the shaker and is pumped to a boot, or sump, and from there to a Concoco revolving feed distributor capable of feeding eight SuperDuty Diagonal-Deck coal-washing tables in the table plant. Normally, however, only six of the tables are used at one time.

● **Table refuse** is flumed to a tank and pumped to a Wemco rake-type classifier making a separation at 48 mesh. Coarse, or 3/16x48, refuse is conveyed to the refuse bin, while minus 48-mesh refuse is pumped to the sludge pond on a hill above the plant through plastic hose (Central Mine Equipment Co.). The classifier was installed to avoid pumping coarse material.

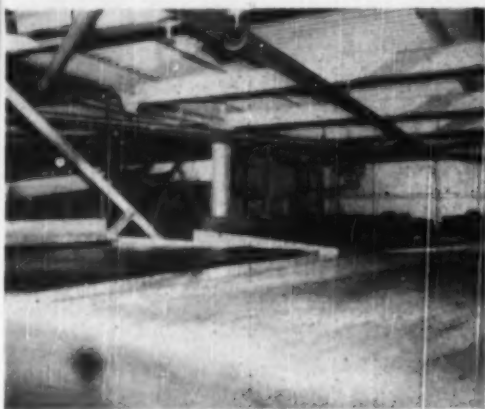
Cleaned 3/16x48 coal from the tables flows to a second tank and then is pumped to a 5x14-ft Allis-Chalmers Low-Head screen for dewatering at 28 mesh. Minus 28 and water are pumped to the sludge pond. The 3/16x28 cleaned coal goes to two 48-in Type S C-M-I centrifugal driers, which reduce surface moisture to 3½ to 5%. The coal, after drying, drops into a fourth 110-ton bin.

● **All loading** is done from these four bins via a 30-in Jeffrey conveyor.

The Buffalo Creek Story — How Quality Coal Is Prepared



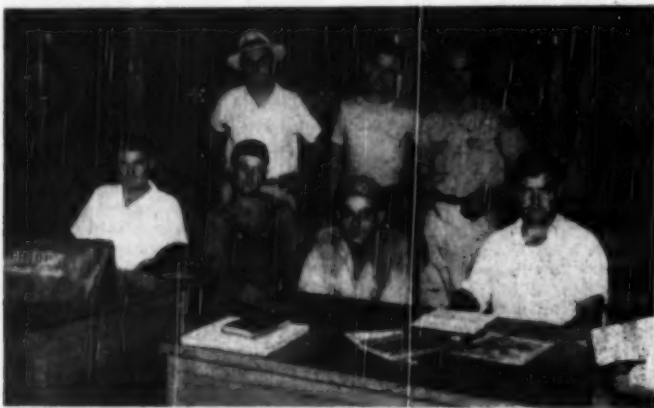
WASHING in a launder unit is the first cleaning step at Buffalo Creek. One of the two control centers in the plant is at the left. Launder washing is followed by screening (right) to produce both final sizes and carbon for retreatment.



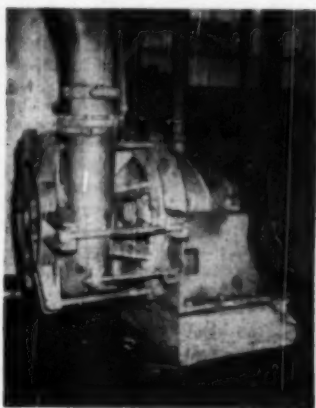
EIGHT TABLES, in two banks of four each, are available for recleaning 3/16x20 carbon at Buffalo Creek.



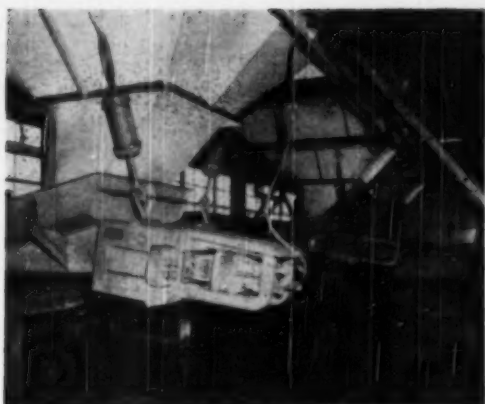
AFTER DEWATERING on a vibrator, 3/16x28 receives final drying to 3½ to 5% surface moisture in two centrifuges.



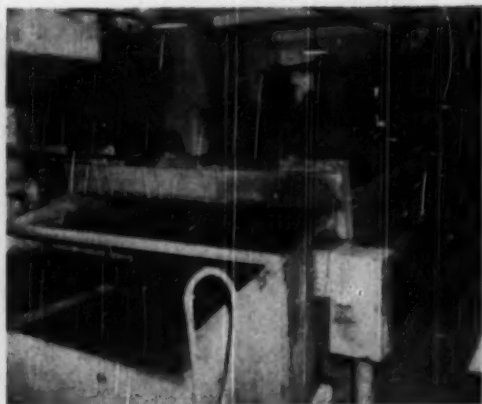
MANAGING BUFFALO CREEK—W. W. Curtis, mine clerk; J. C. Morris, storekeeper; Oscar Ernst, chief electrician; Ivan Berry, chemist; Glen Canada, pit foreman and master mechanic; J. O. Russell, washery foreman; and R. F. Donaldson, superintendent.



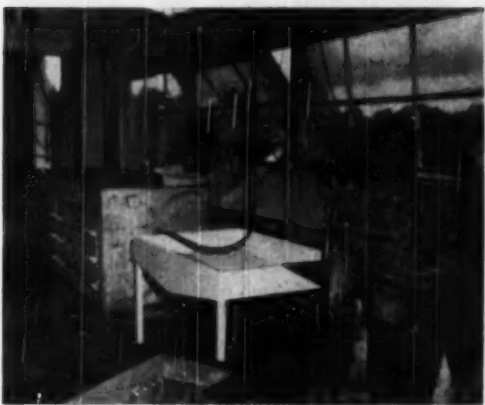
ONE OF THE SEVEN PUMPS installed for handling fine-coal, water and refuse at the Buffalo Creek plant.



FOUR vibrating feeders, remotely controlled from the loading station, handle withdrawal and mixing of sizes for loading.



FINE REFUSE from the table plant is separated out for disposal by pumping in this rake-type classifier.



CONTROL OF BUFFALO CREEK QUALITY starts in this testing and control laboratory in the plant proper.



MOTOR CONTROLS are centralized in this control center, supplemented by control stations in the two washing sections.

veyor (Goodyear belt) leading to the separate two-track loading station. The operator in this loading station controls the drawing and mixing from the bins through remote-control equipment. He is assisted in this operation by high- and low-level Bindicators on each bin. Feeding from the bins to a cross belt discharging to the transfer belt to the loading station is done by four 30-in Jeffrey-Traylor vibrating feeders, one for each bin.

By operating one or more feeders the loading-station operator can make any mix desired, in addition to loading any one of the individual sizes: $1\frac{1}{4} \times 1$, $1 \times \frac{3}{4}$, $\frac{3}{4} \times 3/16$ and $3/16 \times 28$. To change from one size or mix to another, the feeders are stopped to leave a blank space on the belt sufficient to permit changing gates from one track to the other at the loading station.

Thus, for example, if the supply of one fraction for a mix runs low, loading can be shifted to the second track and the part load held on the first until the low bin is refilled.

• Oil-treating with 2,000-sec Soco-Vacuum oil is done as the coal is loaded. Pressure is 120 lb; temperature, 160 F. Average application, because of the porous nature of the coal, is approximately 2 gal per ton.

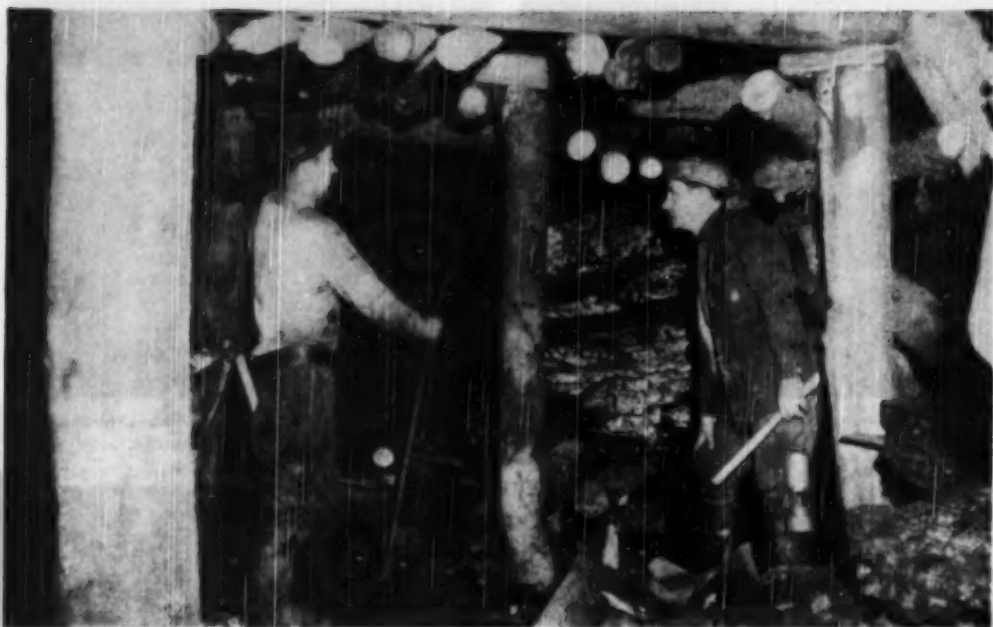
As loaded, average ash in the $1 \times 3/16$ is 3 to 4%.

Featuring Alclad siding and roofing, the Buffalo Creek main plant is operated from two control points through a G. E. Cabinetrol control center. One control point serves the coarse-coal washing section and the other the table plant. The interlocked sequence

system is employed. Motors are primarily Allis-Chalmers, with Jones reducers and Texrope drives for power transmission. The largest motors in service are 75-hp units on the No. 3 crusher and recirculating pump.

Pumping equipment includes the following: two 8x10 Morris, one for $3/16 \times 0$ from shaker sump to boot, and the second for recirculation from boot to launder washer; two 6x8 Morris, one for pumping washed $3/16 \times 28$ and the other for table feed; two 3-in Morris fine refuse to classifier and sludge to pond; and one 6-in Goulds for fresh water. Heat is supplied through Grid unit heaters by a Type C Kewanee boiler.

Sand from the overburden has presented a problem in increased wear of equipment. The answers have included Manganal chutes.



1 MINE FOREMAN GAVIN . . .

WATCHES Miner Bill Davis test roof and timbering in a chamber being driven for the second time. Forepoling provides substitute roof in caved gangways and chambers at Boland, where a ton of timber is installed for each 16 tons of coal removed.

**DeAngelis Coal Co.'s Methods for Recovering Anthracite Pillars
in Caved Ground Bear Out the Statement that Mining Can Have . . .**

'Safety Under Bad Conditions

**Take a Trip Through Boland Mine With Foreman Leon Gavin
to See Bad Conditions and What Can Be Done About Them**

ARE ROOF-FALL ACCIDENTS a necessary evil in coal mining? The experience of some companies definitely indicates that the answer is "No," and points the way to better roof-control—and perhaps eventual elimination of the hazard. One of these organizations is the DeAngelis Coal Co., Carbondale, Pa. The proof that an interesting story was waiting to be told came at the annual first-aid meet of the Northern Anthracite Independent Operators' Association, at Russell Park, Carbondale, this past summer. A feature of the

program was the presentation of a Joseph A. Holmes Safety Association Certificate of Honor to the men and supervisors at the company's Boland colliery for producing 1,960,569 tons of coal with 3,009,090 man-hours of exposure without a fatality in the period from March 16, 1943, to March 31, 1950. In presenting the award, E. H. McCleary, supervising engineer, Bureau of Mines, Wilkes-Barre, Pa., commented on the adverse conditions under which the record was achieved, and therein lies the story.



2 EARLY MINERS . . .

USED this wood track pointed out to Mr. Gavin by Miner Caesar Prutisto, whose gangway intercepted the old haulageway.



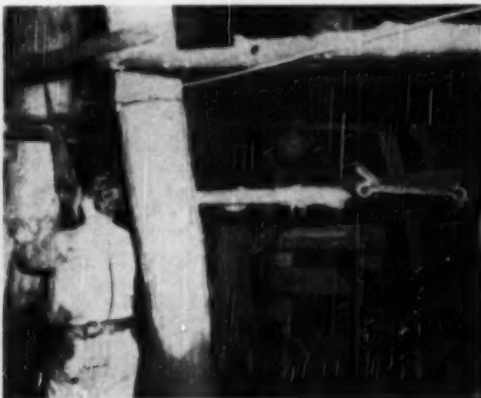
3 SAFETY RESPONSIBILITY . . .

IS ACCEPTED by each employee. Motor Runner Frank Shinoski reports broken timber to Foreman Gavin for quick replacement.



4 CAREFUL PLANNING . . .

IS NECESSARY in re-opening caved chambers. J. F. Munley, state inspector, and Mr. Gavin plan for maximum safety.



5 MECHANICAL AIDS . . .

REPLACE MUSCLE POWER. Chain hoist eliminates possibility of strains and other injuries in placing conveyor drives.

DeANGELIS COAL CO. operates in the northern field in the area where the first underground anthracite mine was opened in 1831, and where production has continued with few interruptions since that time. Operations consist of removing pillars from the Top and Bottom Clark seams and the Archbald seam between the Clark and Dunmore series in mines previously operated by another company.

Most of today's operating problems at Boland stem from the mining omissions and commissions of the past. Surveying and accurate mapping were dispensable luxuries in those days, pillars were not columnized, chambers were too wide and pillars too narrow, barrier pillars were yet to become impor-

tant considerations, and good coal was taken wherever it was found with little thought to the effect of this practice on future mining.

This is not to say that such practices were intentional on the part of 19th century miners; there were no precedents to guide the first operators and the errors of their practice promoted safer mining by their successors. However, the shortcomings of early mining methods created the problems that confront DeAngelis today.

In reply to queries on his company's safety achievement and the adverse conditions at Boland colliery, J. T. DeAngelis, general manager, had this to say:

"Yes, we've made a good record under challenging mining condi-

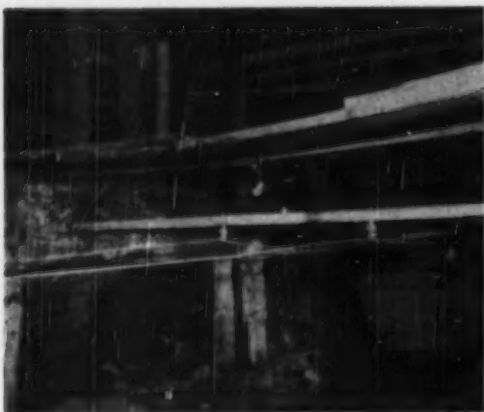
tions but we are not boasting of our safety record nor crying over our conditions. We make ends meet or we wouldn't be in business.

"Perhaps the best way to pinpoint our problems is to look at our timber requirements as related to our employment and production averages.

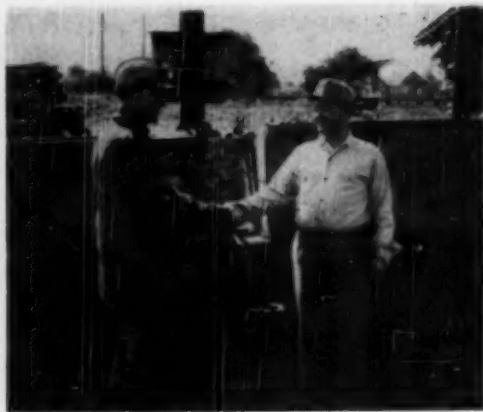
"Timber costs us 50¢ per ton of coal, based on an average daily production of 500 tons and the prevailing cost of \$8 per ton for timber. We employ 141 men. For a firsthand view of operating conditions, I suggest you visit the mine."

At the mine, Leon Gavin, whose experience includes many years of "caved-ground" mining in the Carbondale-Jermyn area, takes up the story. Mr. Gavin is mine foreman

Boland Mine Tour—Safety Under Bad Conditions



6 CONTIGUOUS SEAMS . . .
IN CAVED GROUND make mining difficult, as shown by this foot-of-the-slope view of shallow intervals between seams.



7 WELL DONE! . . .
MR. GAVIN and Edward Farina, president, Local 324, UMW, congratulate each other on the Joseph A. Holmes safety award.



10 SAFETY MEETINGS . . .
IRON OUT perplexing wrinkles as they occur. DeAngelis Coal Co. knows co-operation is necessary under bad conditions.

at Boland and receives from everyone in the company a good share of the credit for DeAngelis' successful operation. He summarizes mining at Boland as follows:

Present underground conditions indicate general caving in the past completely across the synclinal valley in the Carbondale area, and suggest that the cave was a result of wide chambers and narrow, offset pillars in the mineable seams. Rock pressure, straight downward and down the limbs toward the axis of the syncline, crushed the remaining pillars somewhat. Then, the strata broke at rib lines into blocks that penetrated the wide chambers.

The absence of continuous roof and the prevalence of individual

roof sections, on pillars and punched into chambers, makes recovery impracticable by any recognized system of mining. The usual references to "first" and "second" mining and "advance" and "retreat" as recognized steps in opening and recovering sections, and to maintenance of a "breakline" to relieve pressure on active workings do not apply at Boland.

Previous mining has removed most of the Top Clark coal except for that remaining in old pillars.

Because of the impossibility of introducing a new system into a previously-worked mine, DeAngelis is using the old gangways and chambers as much as possible. Debris from early mining and the

general cave which followed is cleaned from the gangways to provide a width of 12 ft. and new timbers are set to stabilize the loose material through which the re-opened gangways are driven.

Old chambers are reopened in a similar manner, 12 ft wide and re-timbered, if the cave has squeezed Top Clark pillar coal into the old workings. However, if the old chamber is filled with rock, a new one is driven in the Bottom Clark alongside the old, caved chamber.

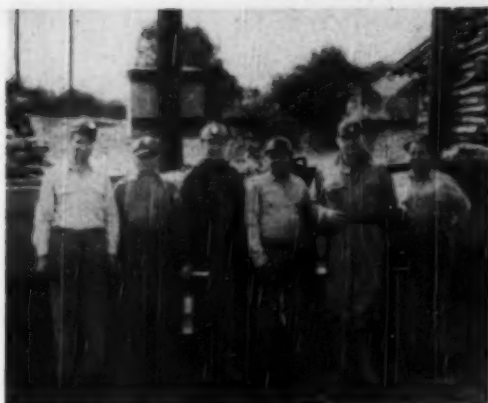
In either case, it is necessary to forepole every foot of advance in old workings as follows:

Vertical hitches resembling shear cuts are prepared by hand tools to receive the legs of the next timber set to be erected. The hitches are 12 ft apart in the face at each side of the chamber.

Forepoles cut from selected lagging material are driven into the face between the coal and the loose rock above it, the miner standing under previously erected timbers to direct the point of the forepole with his bar while the laborer strikes the pole to drive it forward.

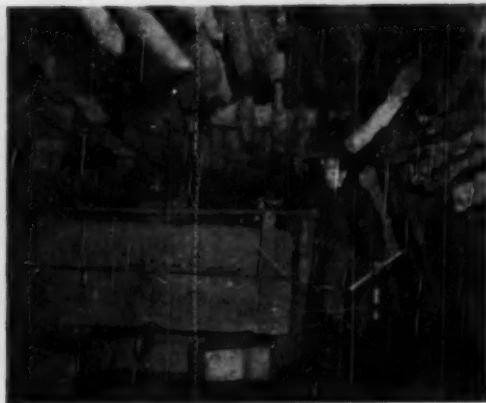
When the skin-to-skin forepoles are in place to form a substitute roof, the coal is dug out along the underside of the forepoles to make room for the collar, which is then placed on the legs in the hitches to support the forepoles.

With this latest timber in place, a block of coal projects from the face into the chamber. The block of coal is defined by a hand-made top cut and two hand-made shear cuts, one on each side, and can be safely removed to the limits of protection offered by the forepoles.



8 PRIDE OF ACHIEVEMENT . . .

AT BOLAND is reflected in the smiles of Messrs. Grizzanti (left), Cerra, Gavin, Farina, Munley and Bonacci.



9 "SAFETY COMES FIRST,

BUT WE GET some coal out, too," says Foreman Gavin as he checks topping on loaded car in forepoled gangway.

Two extra legs are set under each collar at the quarter points to contribute additional strength to the substitute roof.

Shaker conveyors carry the coal to mine cars in the gangway. The conveyor troughs ride on horizontal wood stringers nailed to the two inner legs under each collar. The space under the conveyor and along one side of the chamber is gob room for the large amount of rock that must be handled in recovering the coal.

When a chamber has been driven as far as possible (time and roof action, not prescribed measurements, set the limits), the conveyor is moved to a new place and the chamber is abandoned for a time.

If the inevitable cave which follows fills the chamber with rock, a new chamber is driven through the coal alongside the old one. However, if the chamber fills with Top Clark coal as a result of the adjacent pillar being pushed off into the chamber, a shaker unit is replaced in the old chamber.

This sometimes happens and creates an unusual situation. The chamber which formerly produced Bottom Clark coal will be driven on the same lines and at the same elevation but now will produce Top Clark coal.

Safety a Necessity

In view of this apparent paradox—bad mining conditions but excellent safety—Mr. Gavin was asked to cite procedures which he feels have contributed to safer mining at Boland. He obliged with the following:

1. Experienced Men—When Vincenzo DeAngelis, president, formed the company he selected workmen who were accustomed to pillar-recovery work.

2. Good Training—From long experience in pillar mining in the region, Mr. DeAngelis was able to train these selected men in handling the difficult problems to be encountered at Boland. In addition, every opportunity to secure first-aid and accident-prevention training has been seized. In 1947, the company's first-aid team placed first in the annual first-aid meet and consistently finishes among the leaders.

3. Roof Consciousness—The necessity for building a substitute roof to advance the openings makes top conditions an ever-present concern to everyone in the mine.

4. Extreme Caution—Roof is tested constantly, close visual inspections are frequently made, and a sensitive "ear" for roof noises is maintained. The conveyors are stopped at frequent intervals to permit the miner to listen for what may be ominous sounds.

5. Cooperation—Safety discussions as an aid to safer mining are led by Mr. Gavin at the time and place where problems arise. Thus all underground workers are fully acquainted with immediate problems.

6. Strict Supervision—Mr. Gavin visits each working place twice a day. (It keeps him busy, but he knows what's going on.)

Economy—Also a Necessity

On the question of how it is possible to mine at a profit under such conditions, J. T. DeAngelis, general manager, offers the following explanatory comments:

1. The coal is of good quality and finds a ready market.

2. Blasting, with its accompanying costs, is not necessary except at infrequent intervals.

3. Most of the rock is gobbled in the mine, thus reducing refuse-disposal costs.

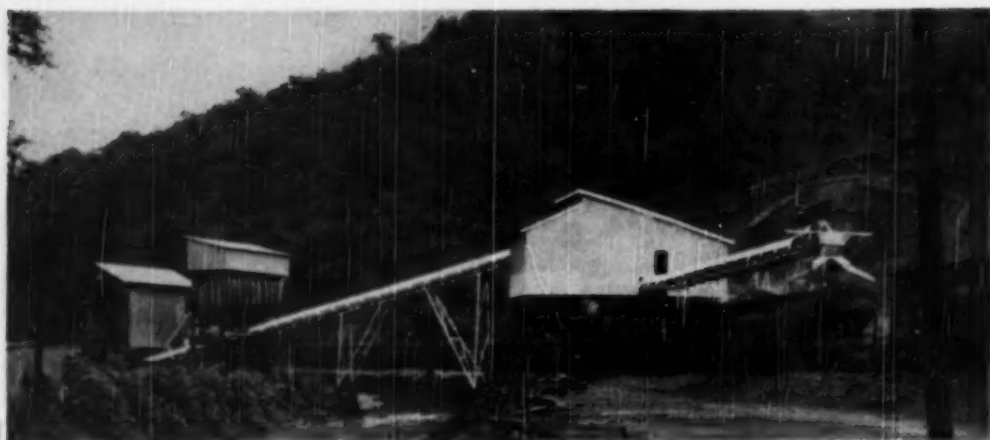
4. Shaker conveyor troughs, bent-to-shape, are purchased from the Hendricks Mfg. Co., Carbon-dale, and fittings are welded to these at the mine.

5. Wherever possible, good sections of broken timber are salvaged for re-use as lagging or thin-seam props.

The emphasis on the roof-fall hazard and the precautions against roof-fall accidents carry over into other mining operations. The safety record also recognizes that haulage, electricity, falls of persons, and tools have not been the cause of fatalities.

Safety is a habit at Boland.

Late reports indicate that Boland miners and supervisors are extending their record. As of Sept. 30, the figures were 2,027,924 tons produced with 3,181,269 man-hours of exposure without a fatality, Mr. DeAngelis reports.



SET UP FOR EFFICIENT HANDLING of trucked coal, Spruce River facilities include dump house (left), storage and blending bin and a 125-tph two-track tippie. Three of the four loading points provided can be used at a time.

High-Capacity and Flexibility in Preparation Feature . . .

"Biggest Little Tippie"

Designed for Efficient Rail Shipment of Truck-Mine Output, New Spruce River Tippie Provides Storage, Blending, Picking and Screening for Two Types of Coal — Tilting Mechanism Clears Truck Tracks After Dumping

HIGH CAPACITY and versatility in handling truck coal are outstanding features of a compact two-track tippie completed in 1949 by the Spruce River Coal Co., Ramage, Boone County, W. Va. Installed to facilitate the purchase, preparation and railroad shipment of coal from neighboring truck mines, the tippie is rated at 125 tph and has loaded as many as 14 railroad cars in one shift. Coal of two types can be blended, picked and screened, the lump crushed and the various sizes moved to four loading points, three of which can be used at one time.

The new tippie is near the old tippie serving Spruce River mines Nos. 4 and 8, shipping from Jeffrey, W. Va. There are several truck mines in the local valley, as well as a number of tracts of coal suitable for small mines.

Loaded trucks are not required to do any backing since they can circle over the scale and across the dump hopper. The dump is protected from rain by a steel shed and is equipped with a power device to

clear the truck runway of dumped coal. The 20-ton Howe scale has a 10x20-ft platform. The scale house and a roof over the platform are Armco Steelex buildings, so designed that the individual sections provide both structural support and exterior covering (*Coal Age*, November, p 108).

The truck dump hopper holds 15 tons. As shown in the accompanying drawing, coal can flow through the openings along the sides as well as through the center opening. Tracks on which the truck tires run are made of steel and are wide enough to accommodate all ordinary types of trucks. The double wheels of some trucks limit the opening between tracks to 24 in. Guards consisting of 6-in steel pipes welded to the track plates prevent the tires from running off the sides.

Although most of the coal discharged by the end-dump trucks flows into the hopper through the center and side openings, a considerable quantity is left on the tracks and must be cleared off before another truck can drive across. The

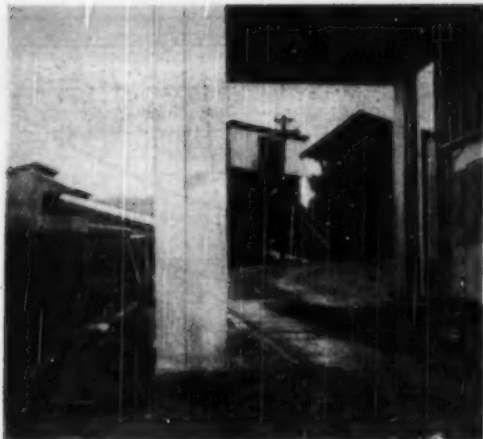
tracks are pivoted to the supporting structure so that they can be tipped to slide the coal into the center of the hopper.

One electric motor operating through a worm gear and chain reduction tilts both tracks. If there is coal on the tracks, the driver of the loaded truck approaching stops and reaches out from his cab to operate push buttons that tilt the tracks and return them to level. The rack rails and pinions used in the mechanism are taken from Goodman cutting machines and, therefore, are easy to replace in case of breakage.

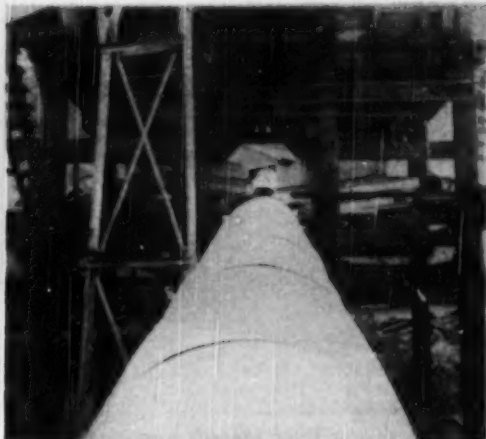
A reversible plate feeder under the hopper delivers the coal either to a 24-in flight conveyor 60 ft long elevating to two 40-ton bins or to a belt which passes under these bins and terminates at the picking table in the railroad tippie. The intermediate 40-ton bins can be used either for storage or for blending. Plate feeders from each deliver to the 13-deg belt, which is 30 in wide on 150-ft centers.

The apron-type picking table is 45 in by 10 ft and was manufactured by the Link-Belt Co. Coal moves from it onto a 5x25-ft Morrow double-deck shaker screen, equipped with a rescreen which normally makes lump, egg and nut-slack.

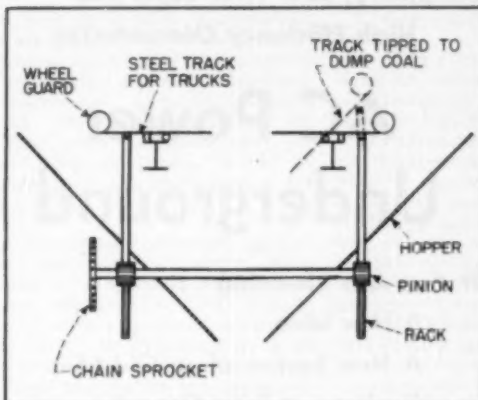
A Jeffrey 24x24-in crusher installed at the end of the shaker screen delivers to a 12-in-by-15-ft



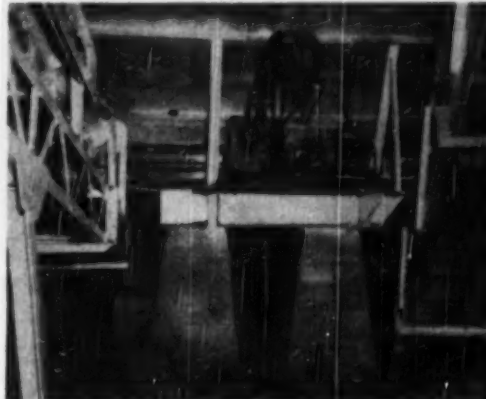
END-DUMP TRUCKS drive over scale and dump hopper without backing. Tilting unit keeps truck tracks clear of coal.



COVERED 13-DEG BELT CONVEYOR to tipple can receive coal directly from dump hopper or from blending-bin feeders (above).



TILTING MECHANISM for clearing coal from truck tracks of dump hopper is operated by truck driver through push buttons.



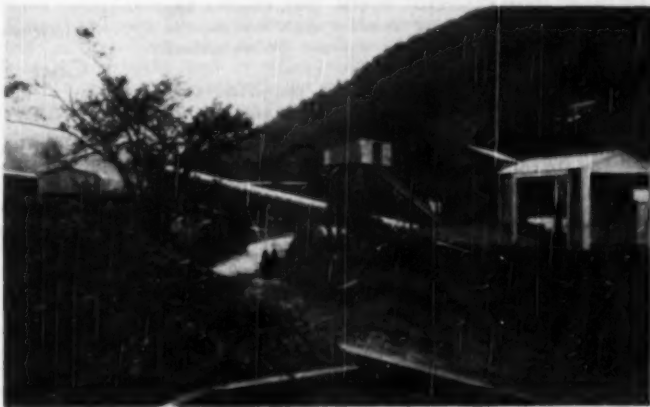
TILTING-UNIT DRIVE under the dump hopper. A reversible plate feeder delivers to a belt (left) or flight conveyor (right).

flight conveyor returning to the slack track, which also picks up fines from the rescreen.

Lump is loaded by a belt boom 30 in by 42 ft, while the egg is carried 86 ft on a horizontal 24-in belt conveyor to a breeches chute delivering to cars on either of the two tracks.

The two seams of coal in which the truck mines operate are of quite different characteristics. With 80 tons of storage capacity and the blending equipment available, Spruce River can mix to suit the market.

H. I. Taggart, Massillon, Ohio, is president and general manager of the Spruce River Coal Co. A. E. Epling is vice president in charge of operations, and John Bryson is chief engineer.



ANOTHER VIEW of the Spruce River plant. From left to right are the railroad tipple, blending and storage bin, truck dump hopper and scale house.

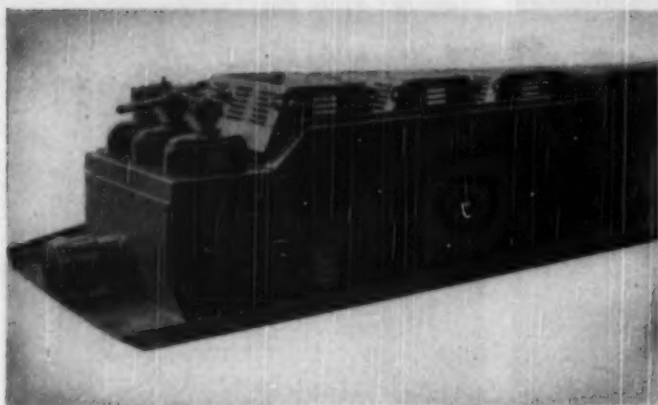


FIG. 1—TYPICAL AC-TO-AC PORTABLE SUBSTATION. This 225-kva unit for underground use features ready portability, low first cost, simplicity of operation and high efficiency.

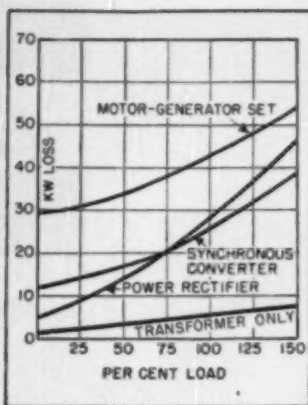


FIG. 2—HIGH EFFICIENCY is shown by the low kilowatt loss of the ac transformer.

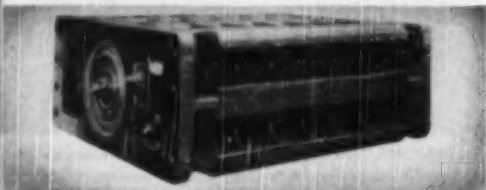
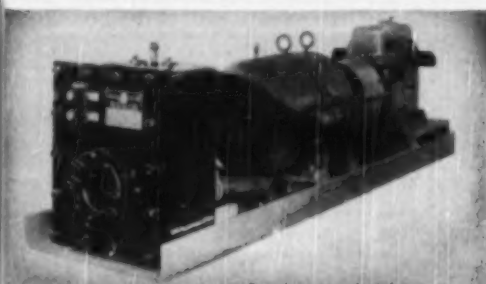


FIG. 4—AC COAL-CONVEYOR POWER UNIT (Top)—a 5-hp 1,800-rpm 220-v totally enclosed fan-cooled squirrel-cage induction motor for underground application, equipped with an enclosed starting controller.

FIG. 5—AC CUTTING-MACHINE MOTOR (Bottom)—a 50-hp 1,800-rpm, 220-v squirrel-cage induction motor for permissible use.

By DAVID STOETZEL JR.
Mining Division
Industrial Engineering Division
General Electric Co.
Schenectady, N. Y.

AC POWER in underground mining operations is not new. Records of its application go back about 40 yr, although the number of ac installations always has been small in comparison with dc. Very few important mines use ac power

throughout, but a large number operate with a combination of ac and dc. In some mines, dc is installed for haulage and ac is used at the face. In others, ac is used in one section of the mine and dc in another. From all indications, the increasing use of continuous-mining machines, and the accompanying tendency to concentrate mining operations in relatively small areas, will mean power-supply conditions more favorable to ac application.

A comparison of the characteristics of the various elements of ac

and dc systems highlight many advantages for ac—only, however, under certain favorable conditions which it may or may not be possible to set up. An ac system will work out successfully only when the mining methods and equipment have been carefully selected and coordinated with an ac power supply in mind.

All phases of underground mining are somewhat complicated in character as a result of the many unfavorable conditions encountered and the more or less temporary na-

**Simplicity, Low First Cost, and
High Efficiency Characterize . . .**

AC Power Underground

If You Are Planning . . .

- A New Mine
- A New Section of an Old Mine
- Continuous-Mining Operation

You'll Want to Know . . .

**How AC Power Provides Definite
Cost, Safety and Operating Advan-
tages**

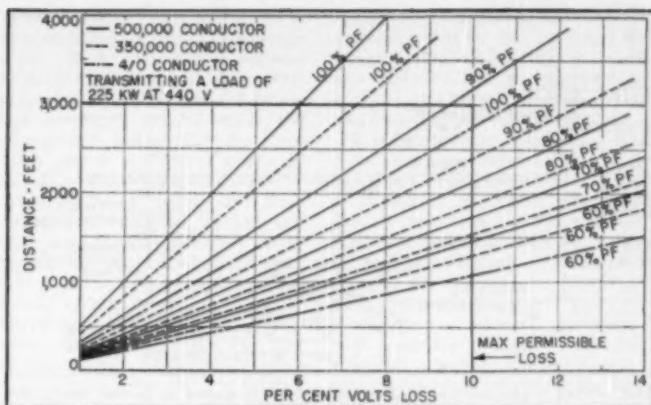


FIG. 3—AC POWER TRANSMISSION using 3-conductor cables, showing the effects of distance, conductor size and power factor on the delivered voltage at a given load.

ture of the location of operations. This factor applies to electrical operation, as well as to the mechanical and mining phases. Electrically, underground operations involve: (1) conversion equipment, (2) transmission facilities, and (3) utilization equipment. In each of these there are advantages in the application of ac power.

● **Conversion Equipment**—Assuming that power is brought into a mine or to a desired surface location (borehole), at 2,300 or 4,000 v, conversion equipment is required to convert to low-voltage ac or dc power. Ac operation requires only simple transformer and switchgear equipment, although various automatic features, such as voltage regulation, overload protection, ground-fault protection, reclosing action, power-factor correction, plug-in connections, and so on, may be incorporated in the substation if desired. Fig. 1 shows a typical ac-to-ac portable underground substation. Contrast this with the size and complexity of the ac-to-dc substation, which usually includes an mg set, synchronous converter or mercury-arc rectifier.

A study of the two types indicates the following advantages for ac conversion equipment:

1. Small size.
2. Light weight.
3. Good portability.
4. Low first cost (in the smaller sizes, the cost per kva is not inordinately greater than the cost per kva for larger sizes).
5. Simplicity.
6. No moving parts (except when equipped with voltage regulator).

7. Low maintenance requirements.

8. High efficiency (Fig. 2 shows losses in various types of conversion equipment—low kilowatt loss indicates high efficiency).

The characteristics of the ac-to-ac transformer substation which make it practical to move it frequently and constantly keep it close to the load are as important as its low cost and high efficiency. Its portability makes it unnecessary to transmit power over relatively long distances at low voltage. This advantage, in turn, has a most important bearing on line voltage regulation—a critical matter for the ac system, as will be explained in considering the ac motor.

● **Power Transmission**—Transmission of ac power underground at low voltage involves a number of important factors, but one—voltage drop or line-voltage regulation—must be constantly kept in mind. As with most power-transmission systems, one of the most important considerations is the delivery of power to the load at close to rated voltage. Because of the voltage-torque characteristics of the type of ac motor usually used underground, it is essential that the minimum line voltage be not more than 10% below the rated voltage of the motors operating on the line.

The effects of distance, conductor size and power factor on the delivered voltage for a given load are illustrated in Fig. 3. All these factors can be controlled to some extent. Using extremely large conductors is effective but expensive. Power factor may be controlled by

the judicious application of static capacitors and the careful selection of motor equipment.

Probably the most effective means of reducing line-voltage drop is keeping transmission distance as short as possible. This means bringing high-voltage lines and substations as close as possible to where power is utilized, and arranging for frequent changes in location so that the low-voltage run will not be unduly extended as work progresses.

The utilization voltage is of considerable importance. At 440 v, the current is only half what it is at 220 v, and line regulation is appreciably reduced. Usually, 220-v circuits are operated ungrounded. A 440-v circuit may be arranged with grounded neutral, thus limiting the voltage to ground to 254 v, which, as far as safety to personnel is concerned, may be regarded as in the same class as the ungrounded 220-v circuit. However, regulations in effect in some areas may dictate the use of the lower voltage.

Economies in cost of transmission equipment may be shown for the ac system if portable substations fed by high-voltage cables may be brought relatively close to the load, i.e., within 300 to 1,000 ft. But if ac power has to be transmitted over relatively long distances at 440 v or less, extremely large cables will be required to keep the line drop within acceptable limits and costs will go up proportionately. Consequently, the successful application of ac will depend to a considerable degree on bringing the high-voltage power relatively close to the working places. Under present regulations, this presents some difficulties. It is to be expected, however, that improved line materials now available, and improved techniques which may be developed, will lead to methods that will permit keeping high-voltage ac lines close to the face, while still maintaining high factors of safety and flexibility.

● **Utilization Equipment**—Power-utilization equipment in a mine consists principally of motors driving locomotives, mining machines, pumps, fans, conveyors and other units. Fig. 4 shows an explosion-proof motor for the power unit of a coal conveyor. Fig. 5 shows a 5-hp, 1,800-rpm, 220-v explosion-proof motor for driving a cutting machine. This ac equipment is very similar in appearance to the corresponding dc units.

The widespread use of dc power

Underground AC Distribution Systems for High and Low Voltage

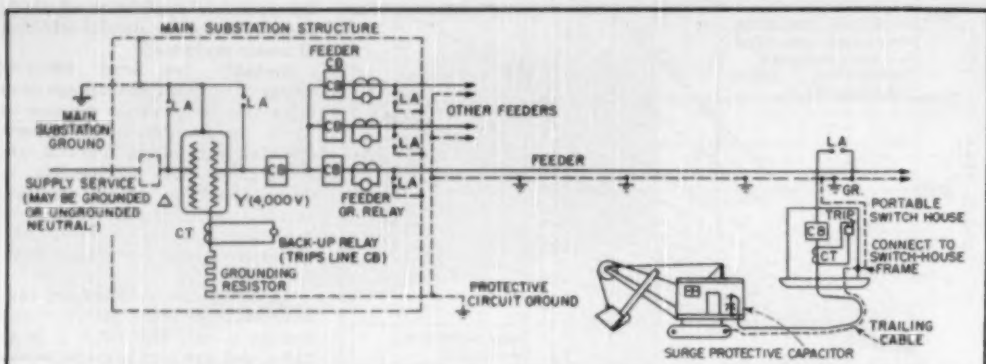


FIG. 6—TYPICAL POWER-DISTRIBUTION SYSTEM, utilizing a grounded neutral, that has been widely applied to open-pit mining with considerable success. The system may readily be adapted to underground mining for high- and low-voltage circuits, as shown in Figs. 7 and 8.

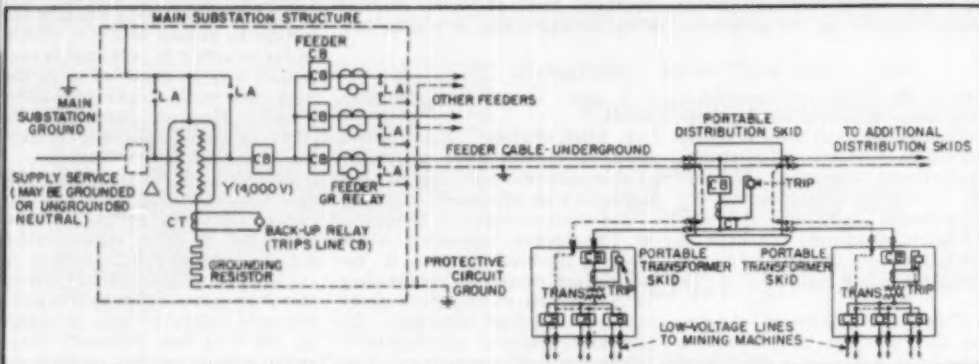


FIG. 7—UNDERGROUND POWER-DISTRIBUTION SYSTEM (for high-voltage circuits) featuring a grounded neutral, as adapted from the open-pit system (Fig. 6).

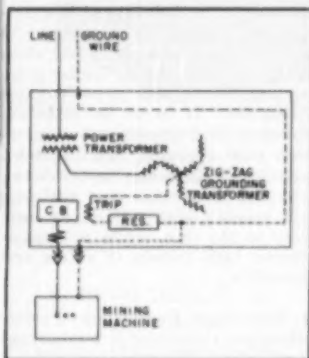


FIG. 8—DETAIL OF LOW-VOLTAGE GROUNDING with low-voltage breakers and circuits on the power-transformer skid shown in Fig. 7.

for underground operations today is largely based on the desirability of dc for locomotives. The superiority of dc motors for transportation is well known. For mining machines, the dc motor offers a choice

of speed-torque and variable-speed characteristics with fairly good efficiency. The dc motor characteristics which work out well for transportation equipment also are very favorable for mining-machine duty.

While multi-speed and varying-speed ac motors are available, ac motors for mining service are essentially constant-speed units, well suited for driving pumps, fans and conveyors. Although the conventional squirrel-cage induction motor is suitable for these drives, it is not well adapted to duty on cutting machines, loaders and similar mining machinery.

The available high-resistance squirrel-cage induction motor provides, however, speed-torque characteristics well suited to such operations. With this type of motor, the speed varies inversely with the torque required for the drive, so that the highest speed is secured at no load, and the drive stalls but continues to exert maximum torque

at zero speed at between 200% and 250% of the full-load torque. This is the same type of characteristic secured by special variable-voltage Ward Leonard equipment on large power excavators, which has worked out so successfully on these drives.

The wound-rotor induction motor also may be used, with the disadvantage of some complication in the control equipment and some deviation from extremely sturdy construction. With suitable control, this motor provides speed regulation and good torque control during starting and rapid reversals. The wound-rotor motor equipped with permanent secondary resistance will produce essentially the same desirable speed-torque characteristics as the high-resistance squirrel-cage motor. A large part of the losses incident to running at reduced speed are transferred outside the motor where the heat may be dissipated readily.

Much of the equipment used underground in coal mines must be

explosionproof or permissible. For such applications, the squirrel-cage motor offers advantages, because the additional complications injected by the slip rings and the necessary secondary control make the wound-rotor motor and its associated control equipment relatively expensive and troublesome.

Recent design trends for such mining machinery as loaders and continuous-mining machines favor the use of the ac constant-speed motor. Many new units utilize hydraulic transmission of power to the several functions of the machine, which permits the use of a constant-speed, continuously running motor, or motors, for driving the primary hydraulic equipment. For such a drive there is no reason why an ac motor should not do as good a job as a dc unit.

● Maintaining Good Line Voltage

—In general, line voltage at mining operations is subject to considerably wider fluctuations than are encountered in most electrical applications. Wide fluctuations result from a combination of a number of conditions, chief among which are the cyclic nature of operations and the rough and semi-temporary character of the whole process. Dc motors of the series or heavily compounded type operate fairly well on abnormally low voltages, since they maintain torque at reduced speeds and produce ample maximum torque. Of course, there is a limit to these characteristics, since stalling conditions are finally encountered and operation at reduced speeds causes excessive heating.

Most dc motors in mines are expected to operate on voltages as low as 70% of normal, unless the control equipment is designed to prevent such operation. The maximum torque output of ac squirrel-cage and wound-rotor motors varies as the square of the voltage applied to the motor terminals. Thus, at 70% voltage, torque is reduced by 50%.

Since a high maximum torque is vital in mining operations, it is extremely important that ac line voltage be maintained somewhere near rated value. Usually, 90% is considered the minimum permissible for successful operation. Low-voltage runs must be short and the entire power-supply system must be carefully and conservatively designed to keep within this limit.

● Features of an AC Mine—An ac mine may well be a mine without track haulage, although battery-operated locomotives or shuttle cars might be a part of the transporta-

tion system. It seems logical that conveyors will be the backbone of the coal-handling system. Ac cutters and loaders, or continuous-mining machines, should very readily work into the picture.

The distribution of electric power to these machines will be a vital factor in efficient operation and will be especially important with continuous machines, which continuously use large amounts of power in normal operation. Continuous mining will require a relatively large concentration of electric-power-using equipment. To maintain acceptable voltage conditions at motor terminals, it will be necessary to keep to a minimum the distances from step-down transformer stations.

This requirement necessitates using many high-voltage cables, frequently moved and extended, with some difficulty and expense in handling the cables to meet safety rules. Because of the excellent construction of modern cables and modern safety-grounding practices, it is hoped that these rules may be modified somewhat to permit more flexibility and easier installation. Easier installation is especially important for a line to a substation serving continuous-mining machines which will be moved frequently.

● Safety Features—In an electric-power distribution and utilization system maximum protection to personnel is of extreme importance. In addition, in mining operations, it is highly desirable to provide features that minimize the interruption to regular operations when a ground fault occurs any place on the system.

Fig. 6 illustrates a system which has been widely applied with great success in open-pit mining operations. Fig. 7 shows that system adapted to underground mining operations (for the high-voltage circuits). Fig. 8 shows the same system applied to the low-voltage underground circuits. These impedance-grounding systems provide maximum safety for personnel, along with selective tripping on ground faults to isolate the interruption in the section involved.

Impedance grounding of this type, whether high- or low-voltage circuits, aboveground or underground, requires limiting the fault current that may flow between the line and transformer neutral. The voltage that may appear between machine frame and ground is limited to a value which may be con-

sidered safe—usually 100 v or less. A resistor between the ground wire and transformer neutral serves to limit the current flow.

With reasonably low resistance at the ground fault, the available voltage (line to ground) is pretty well concentrated across the resistor, which is well isolated for safety. If the transformer bank is delta-connected on the low-voltage side, a zigzag grounding transformer is installed to locate the neutral and provide the point to which the current-limiting resistor is connected.

Relay and tripping equipment is provided to open the line breaker when appreciable ground-fault current flows. By suitable location and timing of breakers, fully selective tripping among a number of feeders and emergency or back-up protection at the substation may be arranged.

● Conditions Favoring AC Power

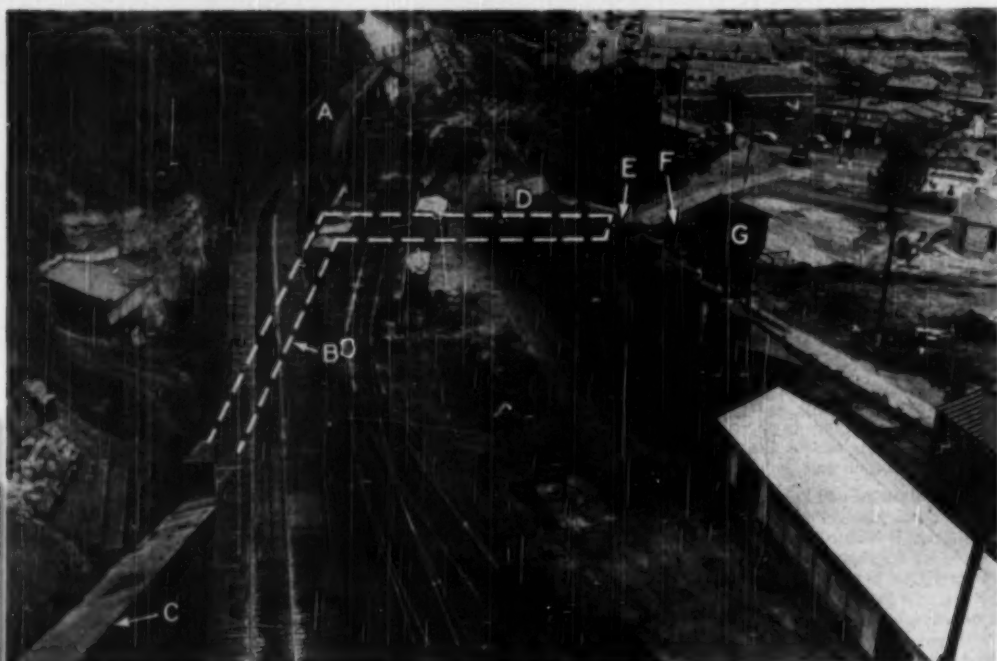
—There are many methods of mine operation and many variations in the systems and equipment used in advancing the working face. Many have been built around dc equipment and, therefore, do not permit the ready application of ac motors and controls. There seems to be no good reason why similar systems, designed expressly for ac motors and controls, should not be used with successful results. As a matter of fact, in 1926 and 1927, the Valier (Ill.) mine held the world's record for the highest daily tonnage hoisted. It was designed as an all-ac mine, with 3-conductor high-voltage cables in trenches along the entries supplying power to transformer stations, which reduce the voltage to 220 v for the ac mining machines.

● Applying AC Power to Three Types of Mines—Where track haulage is used and mining operations are conducted with conventional cutters, loaders, etc., dc power would be available throughout the mine, and there would be little possibility of economically utilizing ac.

Where dc haulage is employed and mining operations are conducted with continuous-mining machines, the possibilities of ac power for these fast-moving mining machines should be studied. A combination dc and ac layout might be worked out to advantage.

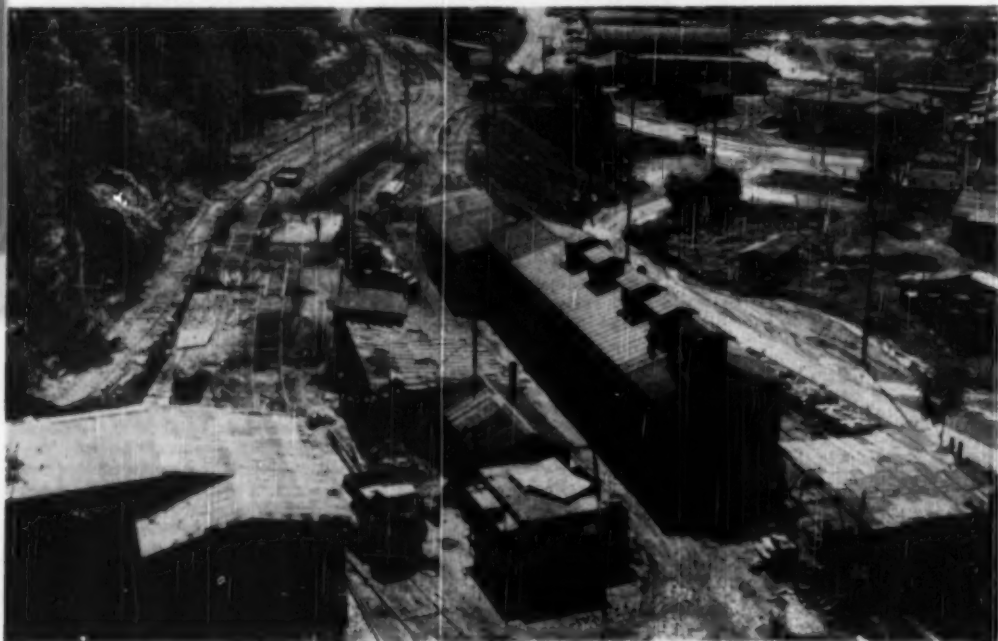
For a new mine, or a new section of an old mine, designed for conveyor haulage and continuous-mining machines, a completely ac-powered operation offers excellent possibilities.

Mine-Yard Face-Lifting Accompanies New Haulage Set-Up at Gay No. 2



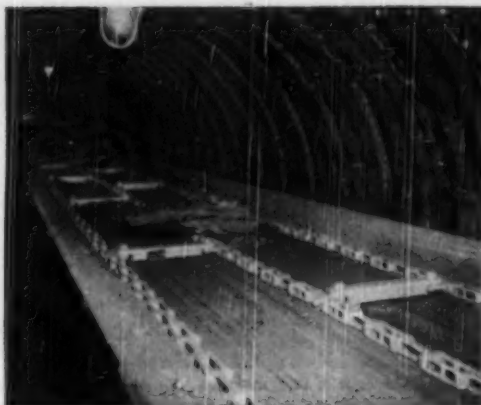
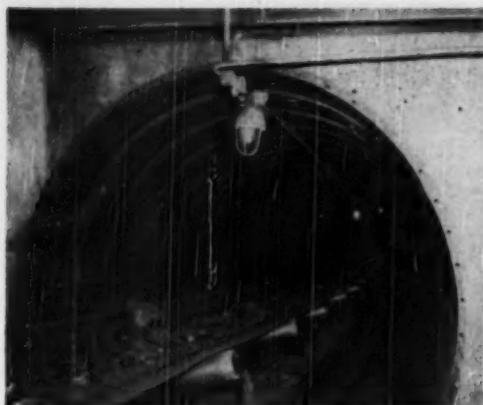
AFTER

IMPROVEMENTS GAVE A NEW LOOK to the tipple area. Improvements include dump house (A) for new drop-bottom cars, tunnel (B) for raw-coal belt (C), tunnel (D) for No. 1 slate conveyor, slate-transfer point (E) to No. 2 flight conveyor (F) and rock bin (G), which houses a second grizzly.



BEFORE

THE TIPPLE AREA looked like this before improvements were made. Haulage to tipple was a bottleneck and some coal was lost with slate in the refuse. Building in left foreground is the original slate-disposal bin.



LINER PLATES support both tunnels. Belt (left) carries raw coal from hopper to tipple through a 7-ft tunnel. No. 1 flight conveyor (right) carries flat slate refuse under the mine yard to the edge of the fill.

Modernizing Gay Haulage

Gay Coal & Coke Installed

New Dump Bin
New Mine Cars
New Conveyors
Tunnel Liners

These Are the Results

Lower Outside Payroll
Better Haulage
Less Coal to Refuse
Neater Mine Yard

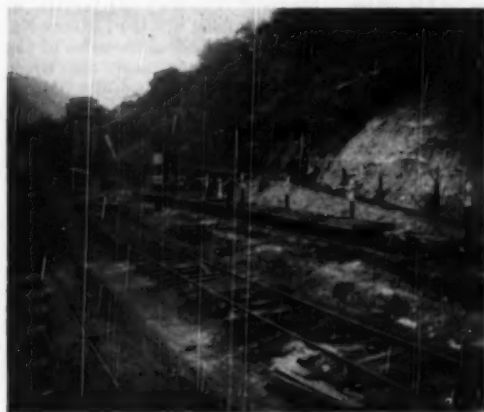
COAL DUMPING AND HANDLING improvements together with a complete set of new cars at Mine No. 2, Gay Coal & Coke Co., Mt. Gay, Logan County, W. Va., cut four men from the outside payroll, increased the efficiency of main

haulage and now recover considerable coal that formerly went to refuse by riding on flat pieces of slate. These improvements, together with installation of conveyors in tunnels supported by steel liner plates, accomplished a pleas-

ing face-lifting operation in the mine yard.

The Mt. Gay operation with the tipple 1 mi from Logan, is the oldest railroad shipping mine in the field. In 1904 the company, under the guidance of Harry S. Gay, Sr., a mining engineer, shipped the first car of coal from Logan County. In 1907, speaking before the Institute of Mining Engineers in London, England, Mr. Gay made the prophecy, then astounding, that mining some day would be done mechanically.

Beginning in 1920, Mr. Gay's son, Harry S. Gay, also a mining engineer, pioneered with his father in



BEFORE CHANGES, cars from No. 2 mine were hoisted up incline one at a time. Tipple now accommodates train of 20 cars.



COAL RIDING ON FLAT SLATE is tumbled onto conveyor pan at transfer point from No. 1 to No. 2 flight conveyor. At the rock bin (right), this coal drops through grizzly into a separate hopper and is hauled by mine car to the trip-dump hopper.

mechanical loading. The son now is vice president and general manager of the company. James S. Laird is assistant general manager; A. J. Jenkins, mine superintendent; John Dean, general mine foreman, No. 2 mine; and Moss Browning, general mine foreman, No. 3 mine. L. H. Honaker, outside foreman, has charge of the tippie and yard activities. Both mines deliver to the same tippie.

No. 2 mine, now producing 1,800 tons per two-shift day, is in the Eagle seam. The haulage portal is at mine-yard elevation. For some years, the output of this mine was hoisted one car at a time up a short incline to an end dump. At that time, 100 low-type 3-ton steel cars served the mine. Although the dumping was automatic insofar as lifting the endgate was concerned, two men were required per shift—one to operate the hoist and one to do the coupling. The haulage locomotive often was delayed while awaiting enough empties to make a trip.

● With mechanical loading and full-seam mining, the coal includes many large flat pieces of slate. These formerly were removed by a 12-in grizzly located between the dump hopper and the raw-coal conveyor. This arrangement was good except that some coal rode across on the pieces of slate and was lost to the refuse.

To replace the 100 old cars, 64 new ACF drop-bottom cars were purchased. Level capacity of these cars is $4\frac{1}{4}$ tons. The cars are without brakes. The 20-car trips, carrying 80 to 85 tons of coal, dump into a 100-ton storage bin. A Link-Belt reciprocating feeder 40 in wide by 24 in high discharges to a new 12-in grizzly. The coal, which seldom in-



COUNTERS SHOW L. H. Honaker, outside foreman, how many cars are dumped at each mine. Lower instruments graphically record the time of day when each trip is dumped.

cludes any lumps over 12 in, falls through the grizzly onto a 34-in belt conveyor 400 ft long, which conveys and elevates to the tippie.

● The chunks of flat slate land on the No. 1 flight conveyor, 36 in wide by 96 ft long, which moves them through a horizontal tunnel to a transfer point at the edge of the mine-yard fill. There the slate tumbles onto No. 2 flight conveyor and unseats any coal that is riding. The No. 2 conveyor, 36 in by 80 ft, elevates to a grizzly in the top of the rock bin. Coal passing through the grizzly lands in a 6-ton car-loading hopper while the slate goes into a truck-loading hopper.

The dump track is installed on a trestle, as shown in the general photographs of the completed job. In addition to serving as an overhead crossing at the mine portal, this elevation also reduced the depth of excavations necessary un-

der the dump hopper and for the tunnels.

Though it appears from the photographs that the trestle track extends through and beyond the tippie, it actually ends under the building, thus allowing sufficient total length of track for backing a 20-car loaded trip over the dump preparatory to pulling it ahead and effecting the dumping. Actual dumping time is seldom over $1\frac{1}{2}$ min.

● The underground portion of the belt from dump hopper to tippie is in a slope 7 ft in diameter and is supported by Armco tunnel liner plates. No. 1 flight conveyor is in another tunnel 96 ft long, extending from the dump hopper to the edge of the mine-yard fill. This tunnel is 8 ft in diameter and likewise is protected with Armco tunnel liner plates.

No. 3 mine, in the Alma seam higher on the hill, produces 1,000 tons per two-shift day. It delivers to the same tippie via a retarding conveyor. Counters and service recorders in the offices of Mines No. 2 and No. 3 and in the office of the outside foreman near the tippie total the cars dumped and imprint dumping time on circular charts.

A Belknap calcium-chloride washer for the 3x6-in egg was added to the tippie about the same time as the car-handling improvements were made. This washer augments the original cleaning unit, which consists of a Roberts & Schaefer Stump air box for cleaning the $\frac{3}{8}$ x0 coal.

T. W. Guy, Charleston, W. Va., consulting engineer for Gay Coal & Coke Co., planned and engineered the outside improvements and the installation of the Belknap washer. The job was completed in February, 1949.

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Get UNIFORM SPEEDS throughout shift with **EXIDE-IRONCLAD POWER**

Put full shift availability into your battery-powered locomotives, trammers and shuttle cars. With Exide-Ironclad power, they'll handle as much load during the last hour as during the first. Also, Exide-Ironclad Batteries assure you:

- safe haulage.
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- low operating and maintenance costs.

- exceptionally long life—proved in more than 100,000 heavy-duty jobs.

Combined, these superior characteristics make Exide-Ironclad Batteries your best power buy . . . at any price.

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A PERSONAL INTEREST IN PEOPLE, at work and in your community, will help you enjoy . . .

Foremanship and Citizenship

The Principles of Good Foremanship Are Not Secret—
The Efficient Supervisor Accepts a Personal Challenge
to Make His Role as a Leader Fit His Way of Life—
You Have a Good Job—Enjoy It

GOOD FOREMANSHIP is not something to be applied 8 hr, then forgotten until the whistle calls you to work the next day. Foremanship, and all its implications, is part of your way of life, with your in-work methods and after-work actions combined to make up the man that is you.

Foremen's Forum makes no attempt to stereotype the mine boss, nor to limit the following remarks as applicable to foremen only. However, informal conversations with supervisors, on and off the job reveal a high measure of consistency and a number of striking similarities among the men who supervise coal mining, the methods they employ and the results they achieve.

The Mine Supervisor

As often as not, the mine boss also is a Boy Scout leader, a church official or an active participant in some charitable effort in his community.

He is a family man and a good

neighbor. His interest in the progress of his own children extends undiminished to the sons and daughters of his neighbors.

The political affairs of his community receive his close scrutiny and interest because, after all, the administration of his local or larger neighborhood affects all other interests in his life.

The good foreman's attempts to prevent misunderstanding of what he says often border on bluntness, which appears to be all right because the men he leads have a similar attribute.

More often than not, he is an educated man. In this regard, education is used as defined by Webster, who takes his definition from the Latin infinitive, *educere*, meaning to lead forth. This continuous process, which leads to disciplined character, is not confined to book learning but requires that such study be tempered by experience in mining skills and dealing with people. Dealing with people differs from handling people, as most bosses

lean to "dealing with" and not "handling."

He is a man of definite opinions on matters pertaining to his work and his responsibilities as a citizen. These convictions are based on his experience, study and information. He voices them to steady younger or less-informed men when they show a tendency to "go off half-cocked."

It appears that most mine foremen are aware of America's pride in its educational advances. High-school training now is available to all who accept the offer, and higher training opportunities are open to more of our young people, although they may be required to expend some extra effort getting such training. The point is this: Our educational advance, as shown by the higher level of formal training among younger mine employees, is a challenge to the good supervisor. He must reconcile the rights of these men, as they learned them in our schools, to the demands and duties of earning a living and building a career in coal mining.

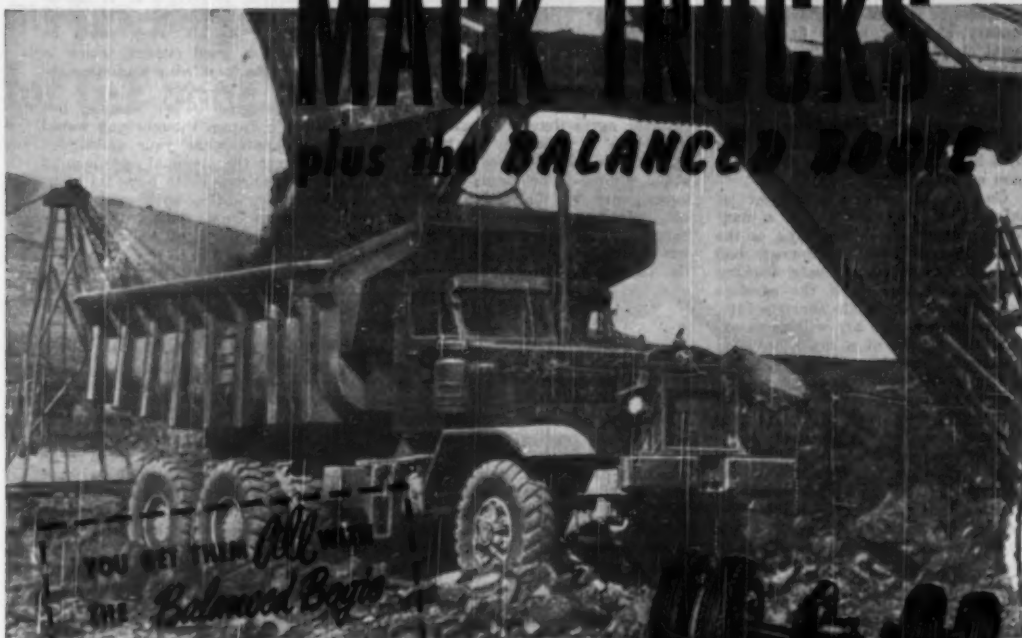
Good Supervisory Methods

On the basis of conversations with mine supervisors, as noted, it is submitted here that mine supervisors are mature men of disciplined character. The good mine supervisor, therefore,

a Profit-Winning Combination

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plus the **BALANCED BOGIE**



YOU GET THEM *all* WITH
THE *Balanced Bogie*

POWER DIVIDER: Positive traction regardless of terrain

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RUBBER SHOCK INSULATORS: No spring twist . . . no lubrication

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SELF STEERING: No tire scuffing

UNIFORM TIRE LOADING: Longer tire life

UNIFORM BRAKING: Better control

No weight transfer between axles
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• Mack six-wheel trucks

incorporate Mack's famed Balanced

Bogie—give you a profit-winning

combination under the most adverse hauling

conditions. Here is no makeshift assembly—but a bogie

that is a component and integral part of the complete truck unit.

No other trucks—for operation on or off the highway

—offer you all the outstanding advantages you get with

the Balanced Bogie in Mack six-wheelers.

Check them for yourself. They're your assurance of

trouble-free, uninterrupted schedules; lower costs and

increased profits. For the full story, see your

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Be Profit-Wise

modernize with

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Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; Long Island City, N. Y. Factory branches and distributors in all principal cities for service and parts. In Canada: Mack Trucks of Canada, Ltd.

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takes an organized approach to his work.

He may be convinced, sometimes, that he is being organized, stabilized, standardized and administered into an operational straight-jacket, but on further reflection realizes these controls are part of living in the 20th century, and that, by and large, personal bigness still identifies a leader among men.

The organized plan and the organized approach are his assistants, and their presence gives him more time to act naturally in his daily contacts with his men at work and his neighbors at home.

On the all-important matter of safety, the consensus is that a man-to-man approach, in the mine, is the most effective way to correct bad habits, instruct men in safe working practices or reprimand the careless or hazardous for their shortcomings.

Good bosses also are willing to extend the benefit of a doubt to good workers in searching out reasons for poor performance. This is not coddling. It is an honest attempt to solve problems by uncovering contributing factors to the low performance.

Pertinent information, distributed where, when and to whom it is important, is cited by a number of supervisors as an excellent means of preventing friction between workers and supervisors. To be specific, here is an idea offered by a section foreman from Illinois. He says that new machines are exhibited on the surface for a few days before they are placed in service. This gives the foreman an opportunity to describe the machine, point out its advantages and give the reasons for its purchase to the men who will use it. Also the men have a chance to examine the machine, discuss its features and try its controls. The men who will use the machine invariably have worked up enthusiasm prior to its use in the mine, so they are ready to accept it and eager to see what it will do. He points out that such a program eliminates much of the resentment that usually follows when a new-type machine comes as a surprise.

On their relations with their men, several supervisors have said something like this: "I know what I must do and I have a plan for doing it, so I present the work to the men in the manner I would like to have work laid out for me." We assume such a foreman expects and furnishes clarity, conciseness and completeness in his work orders.

This, of course, is the Golden Rule, and while it may appear that the Golden Rule is an inoffensive old saw, reserved for Sundays and children, it must be admitted that each day's experience proves it is still in force. Any attempt to talk or write of these matters carries the sound of a sermon, but you have seen the effectiveness of its application in the success enjoyed by some of the old timers who command your respect.

Results of Good Supervision

You expect to receive personal benefits for any personal effort you put forth. The effort you make to become a good supervisor is repaid in the esteem your men and neighbors accord you, as well as in the high regard your superiors have for you. Here are additional specific benefits.

In answer to questions on the relationship among production, safety, and section harmony most section foremen agree that when one of these indicators of efficiency is high the others also show improvement. In other words, if the number of grievances going over the section foreman's head is reduced by his own efforts his safety and production performance improve. Likewise, if accidents can be reduced by better supervision,

gripes become less numerous and tonnage goes up. It seems to be a logical conclusion. Sincere effort should bring good results.

The precepts upon which good foremanship is based carry over into every other human activity. It is inconceivable that a man who lives good foremanship in his work could be other than a good citizen, which is nothing more than being a good neighbor.

We apologize if we ramble, but Foremen's Forum thought you would like to know what your colleagues think about the personal approach to human relations. From personal long-standing friendship with many mine bosses and from talks with newer friends in your ranks, we've come to this conclusion: You have a good job—enjoy it.

Don't Be Half Safe!

HE TOOK HIS HALF in the middle. A collision resulted. He paid for the damage to both cars because he was only half right. Being half right is usually better than not being right at all, but not always. More harm is done by telling half-truths than by having no truth at all in the statement. A half loaf is better than no bread. A loaf will go a lot further. A half dollar is only 50¢ and will not buy as much as a whole dollar—just half as much.

We all know the advantages of having the other half of the good things, but do we count the cost when we neglect the other half of our duty. There have been but few serious highway accidents where one car has been entirely on the other fellow's side of road. He was just partly over but that partly was enough to break the law, destroy automobiles and kill people. Running a red light that "just that second turned" has the same result. You have seen what happens to these half-way drivers many times, but what about yourself.

Let's look at the half-safe miner. He puts on his goggles outside and wears them in the open man trip until they begin to fog, then he takes them off. On the outside he sits out from under the trolley wire; he moves over under it where there is more room as soon as the car gets inside. He waits until the trip NEARLY stops before he jumps out. It is only part of the time that he carries his detonators in the rule pocket of his overalls. His powder bag doesn't always have a hole in it and slate just cut his shooting cable off too short last week. He tested the top good yesterday evening so he gives it a hurried once-over this morning. He is going to set a safety post as soon as he loads the first car—if it isn't changed out too quickly. He thought the cut was deeper or he would not have drilled

on the solid. The man was not working yesterday in the breakthrough that was cutting into his place so he fires his shot this morning without going around to notify him. He uses his slate bar most of the time but the pick will do to pull this little brow right now.

Each of you can add many more items to this list. He is half right but he is a constant hazard to all who work in his vicinity. Would you let him go into your mine or on your section if half his cap was a good hard cap and half was soft and non-insulating; if his goggles had only one eye protected; . . . if one pant leg was tied up as it should be and the other not; if one shoe had a hard toe and the other did not; if the lower part of his dinner bucket was full of holes and would not hold water; if there was only a half handle in the shovel he was taking in and only one point on his pick; if his identification check was broken and only half of it was on his belt which also was about half worn away?

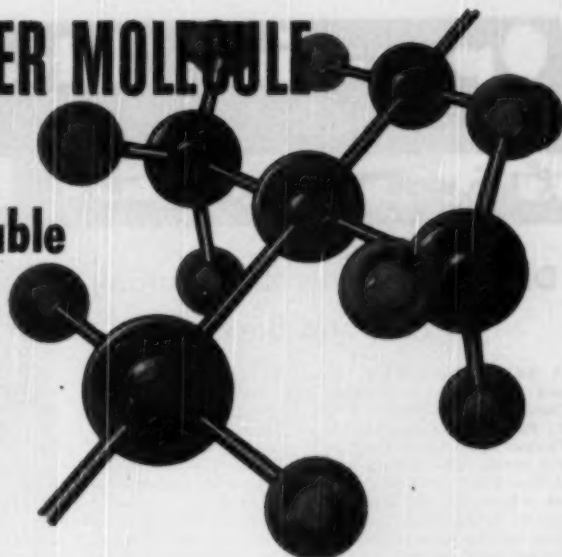
No, you would not let this man go on your section and none of your men would work with him if you did. This man is more ridiculous than a lot that we see. Here we are visualizing a lot of things at once. Actually, we see them all as separate items often enough to be astounded, for each substandard condition is a hazard.

Let's do away with half-hearted feelings and half-right methods and be not almost but altogether right all the time. The only difference between one constant substandard condition and a great many is in the length of time it takes for the accident to catch up with you.

Standard conditions bespeak a good safety record.

—Adapted from *Safety News Letter*, Eastern Gas & Fuel Associates.

This **MADE-TO-ORDER MOLECULE** means longer service for G-E mine power cable



COMPARE—and be convinced!

These figures, comparing Super Coronol insulation with ASTM and IPCEA requirements, show conclusively the superior physical and electrical properties of this cable.

PHYSICAL PROPERTIES

	IPCEA AND ASTM REQUIRE- MENTS	SUPER CORONOL (Typical Values)
Original		
Tensile strength, lb/sq in.	450	750
Per cent elongation	250	600
Set in 2-in. test piece in.	1/2	%
After 7 days in gear oven at 70 C		
Tensile strength, lb/sq in.	400	700
Per cent elongation	200	525
After 48 hours in oxygen bomb at 70 C		
Tensile strength, lb/sq in.	400	675
Per cent elongation	200	525
Cold bend	-10 C	-10 C†
Ozone resistance	3 hours	excellent!††

ELECTRICAL CHARACTERISTICS

Insulation resistance		
K value	5280	15000 and up
Power factor, per cent	3	1

†Can be installed at temperatures down to -40C
††Many samples have shown no signs of de-
gradation after 72 hours' exposure.

Look to G-E wire and cable for
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**MORE TONS
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Investigate these famous G-E cables for
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Billions upon billions of these man-made butyl molecules form the basic ingredient of the insulation of General Electric Super Coronol mine power cable—molecules custom-built to assure extra-long cable life even under the most difficult operating conditions. This insulation—actually an improvement on nature—permits Super Coronol cable to offer all these advantages:

OZONE-RESISTANT. Super Coronol cable is ideal for high-voltage installation—to 15,000 volts—wherever there is danger of corona and resulting ozone.

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HIGHLY FLEXIBLE. Even at extremely low temperatures Super Coronol flexes easily.

EXTREMELY STABLE. Super Coronol is highly resistant to oxidation and aging, and to acids, alkalis, and sunlight as well.

LIGHTWEIGHT. In medium-depth borehole installations, Super Coronol cable may be directly suspended by the conductors.

ELECTRICALLY PROTECTED. The conductors in Super Coronol mine power cable are covered with a metallic shield to drain off induced potential charges; ground wires provide a low-resistance ground-return circuit.

MECHANICALLY PROTECTED. Jacketed with tough, smooth Geoprene, Super Coronol cables take abrasion in stride, may be re-used in other locations as requirements change.

Cable replacement costs go down in a hurry when you specify General Electric Super Coronol cables. You can't afford to ignore these savings. For further information, consult your local G-E Construction Materials Distributor or cable specialist. Section W22-1214, Construction Materials Department, General Electric Company, Bridgeport 2, Connecticut.

You can put your confidence in—

GENERAL  ELECTRIC



Drill Ram Makes Roof-Bolting Fast and Sure

A SELF-CONTAINED, self-propelled combination drill and ram makes roof-bolting easy, fast and sure at the Gorgas mines, Alabama Power Co., Gorgas, Ala. Invented by Paul Glaze, chief electrician at Gorgas, and built in the Gorgas shop, 11 of these units now are in operation at the mines. The accompanying photograph shows how the drill-and-ram machine looks. A rotary drill is so mounted on a hydraulic cylinder that when the hole is drilled, it can be swung out of position, the roof bolt inserted in the hole and the hydraulic ram swung into position. The ram drives home the bolt—the split type with wedge—without relocating the machine.

Hydraulic pressure for drilling and ramming is provided by a pump complete with an oil reservoir of ample capacity. Control valves conveniently located admit pressure to the drill cylinder or the ram cylinder as desired.

The machine is equipped with three rubber-tired wheels. Only two wheels are used when the machine is in working position. Balanced design makes it easy to lower the machine onto the third wheel for tramming. Tramming power is provided to the forward wheels through clutches and chain drives controlled by levers on the handle bars. The forward wheels are powered individually and the operator can guide the machine by working the levers.

Plans are under way to equip the machine with a torque device for tightening roof-bolt nuts. Where expansion-type roof bolts are used the machine can be equipped with the ram attachments.

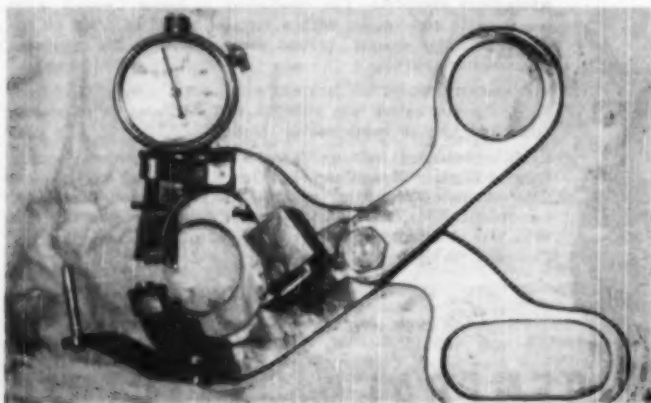
The drill-ram machine now is being manufactured and sold by Continental Gin Co. Birmingham, Ala. It is



DRILL-RAM MACHINE, developed and used at Gorgas mines in Alabama, drills holes for roof bolts and fixes bolts in place without changing position.

equipped complete with drilling cable, one set of drill steels with carbide drill bits, and a ram extension for connection to roof bolts.

Mine-Built Unit Detects Invisible Wear in Hoisting Rope

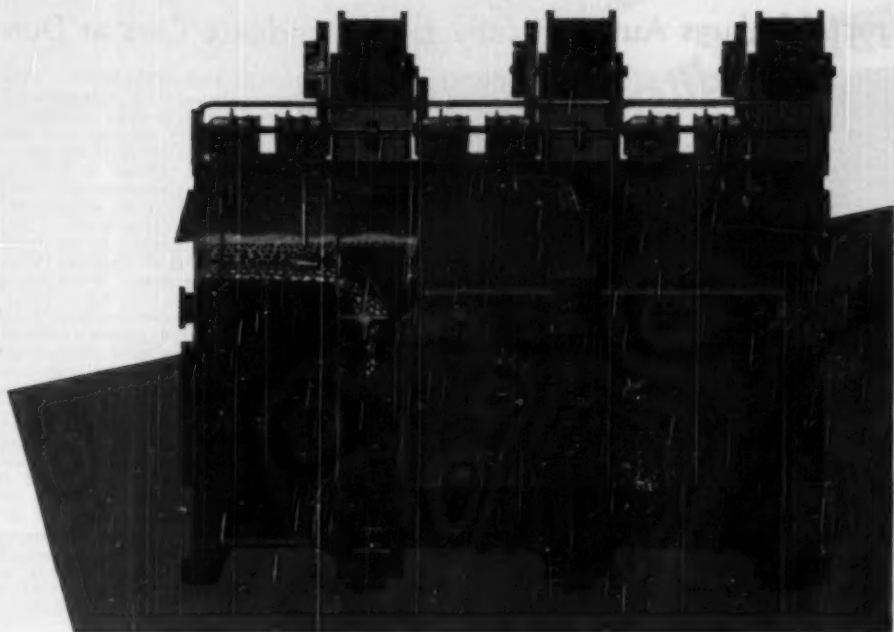


DESIGNED TO DETECT invisible wear, this new device will measure the circumference of hoist ropes $\frac{3}{4}$ to $1\frac{1}{2}$ in in diameter, to the nearest thousandth of an inch.

IN TESTING HOIST ROPES it is important not to miss sections of the rope where there may be a substantial decrease in diameter without any external show of wear or corrosion.

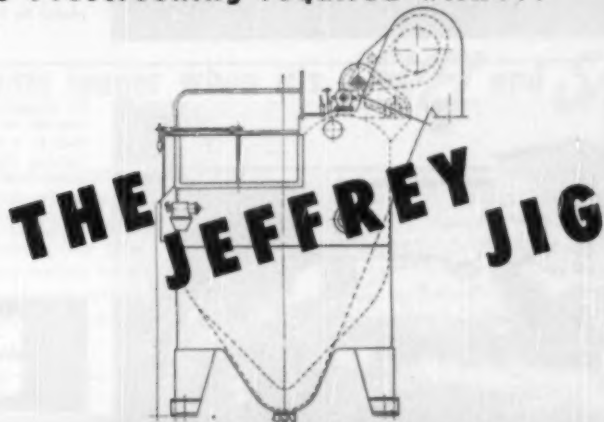
Designed to detect such danger spots, the "Wear-O-Meter" shown above can accurately measure the circumference of ropes $\frac{3}{4}$ to $1\frac{1}{2}$ in in diameter to the nearest thousandth of an inch, *Engineering & Mining Journal* reports. The instrument was designed by H. K. MacKenzie, master mechanic at the Pioneer Gold Mine, Pioneer Mine (P. O.), B. C., Can. He has applied for patent rights but the device is not yet on the market.

In operation, the Wear-O-Meter is clamped over the rope and pressure is exerted on the scissors-like handles. Variations in diameter are read directly on a micrometer dial, and the tension is kept constant by a small tension indicator.



**Jeffrey 84" Three Compartment, 6-cell Jig with
126 sq. ft. of Screen Area.**

No Prescreening required with...



THE JEFFREY MANUFACTURING CO.

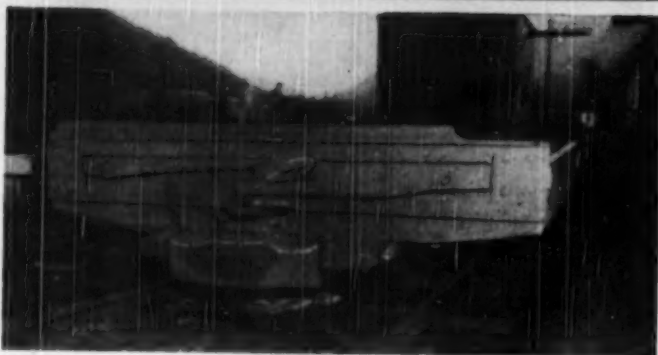
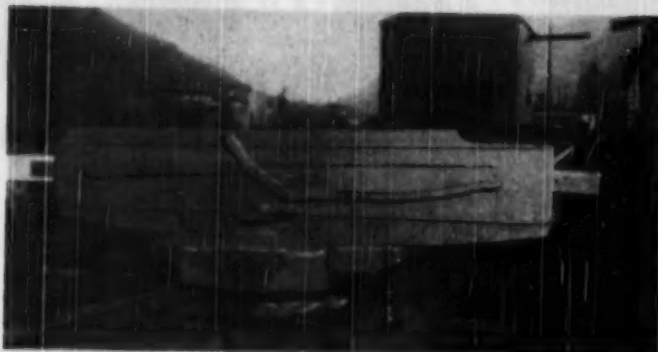
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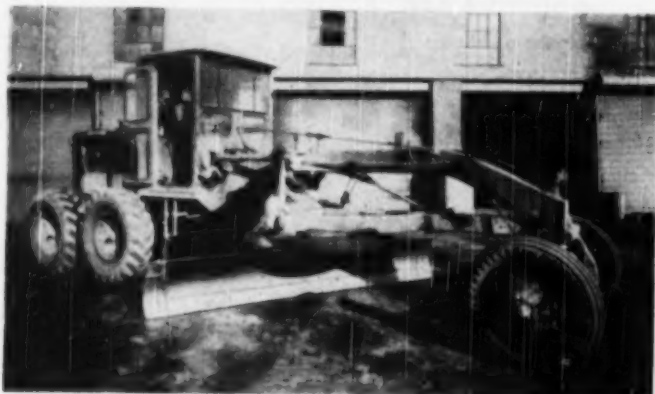
Retractable Lugs Automatically Empty Endgate Cars at Dump



LIFT-ENDGATE MINE CARS can be automatically discharged at the top of a steep slope or incline if the endgates are equipped with protruding lugs as shown on this car. When connecting the car to the hoisting rope, the coupler operates the lever in the center of the endgate to force out the lugs on each side of the endgate (top photo). At the dump, the lugs slide up on steel-clad ramps and raise the endgate. When the empty cars return to the bottom, the coupler reverses the lever to retract the lugs and restore clearance for travel in the mine (bottom photo).

These photographs were recently made at the Gay Coal & Coke Co., Mt. Gay, Logan County, W. Va. Actually, the cars no longer are in service, since No. 2 mine was re-equipped with drop-bottom cars and the mine-yard dumping and slate-handling facilities rebuilt to achieve greater efficiency (see p. 98 of this issue). The old endgate cars equipped with retractable lugs served the mine for many years however, before the modernization program was completed.

LIFTING LUGS sticking out beyond the sides of the car (top photo) automatically open the endgate at the top of a steep slope or incline. To provide clearance for mine travel, the lugs are retracted (bottom photo) by reversing the lever in the center of the endgate.



Hard-Facing Boosts Grader-Blade Life Four-Fold

HARD-FACING the blade of this road grader used to maintain roadways at an Illinois coal mine lengthened its service life four-fold, it was recently reported. Formerly, the highly abrasive service was wearing out

a blade in 3 wk. Welding on replacement pieces was not successful, since they became badly warped. But with the application of hard-facing to new blades before they were used, 3-mo service was secured from one blade.

In preparing the new blade, a $\frac{1}{8}$ -in deposit of Haystellite tungsten carbide in a tube rod was applied to the cutting edge and up the sides of the blade. When the hard-faced blade finally became worn, it was again hard-faced to provide another similar period of use.



"We Can Top That!"

HAVE YOU EVER read one of these Operating Ideas and thought to yourself that that "idea" you or one of your associates developed ought to be in **COAL AGE** too? Well then, why not break down and spend a couple of minutes to send it along? Not only will we be glad to hear from you, but we'll gladly pay \$5 or more for each acceptable "Operating Idea," on publication. Just write: The Editor, **COAL AGE**, 330 W. 42 St., New York 18, N. Y.

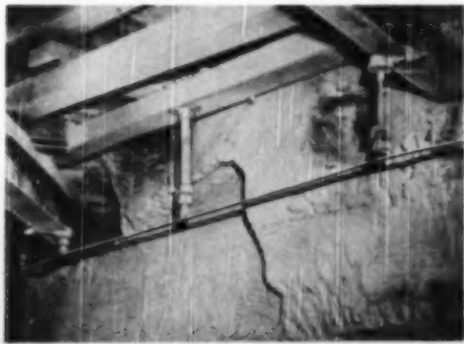


Smooth Underrun Bulldog Clamps let the current collector ride the wire without bumping or arcing, and provide better clearance for collector passage.

Trolley Wire lasts longer when it's *LEVEL* and *SMOOTH*

Use O-B trolley and feeder materials to keep the bounce out of your current collector performance. Smooth, level trolley wire gives your locomotive collectors a slick, trouble-free ride; on the other hand, bumpy, uneven trolley wire gives the collector a rough time; causes arcing, wire-burning, and shortens the wire life considerably.

Collectors follow the wire easily when it is held at a uniform distance from the track.



O-B trolley and feeder materials provide the simplest and best methods for hanging trouble-free trolley wire. All wire-holding fittings, such as clamps, frog and crossover end fittings, splicers, switches, etc., leave the bottom and sides of formed wire unobstructed. The clamping is done on the upper lobe of the wire. Adapters, hangers and brackets can be combined to maintain level trolley wire in places where the mine roof varies in height. Dead-end fittings provide plenty of take-up; make it easy to maintain a taut, level trolley wire.

Fifty-eight pages in your O-B Mining Catalog are devoted to wire-saving feeder and trolley materials. Check these pages for equipment that will add life to your overhead trolley.

Ohio Brass
 MANSFIELD  OHIO, U. S. A.
 CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HAULAGE WAYS Jr.



New Shoe for Heavy Duty Tandem Locomotives

O-B TYPE-M SHOE LASTS LONGER; IMPROVES CURRENT COLLECTION

Increased current collecting area and a double shunt are features that give the new O-B Type-M shoe increased service life. These two features have been added to the familiar O-B Type-L shoe design in order to avoid severe collector wear in heavy duty haulage, where currents of more than 2000 amperes are needed to move loaded trips. In all other respects the Type-M shoe is the same as the Type-L shoe. The same pole head, harp, and other parts are used for both.

Current transfer points in the Type-M shoe are distributed over a larger area, with a corresponding decrease in heating effect. The double shunt lowers resistance to the passage of current from the shoe to the pole leads. It also helps to dis-

sipate heat produced in the shoe as a result of heavy currents.

A cooler-running shoe lasts longer because arcing cannot easily burn or pit the cool metal. Longer life reduces down time and service labor; lets you operate your haulage system more economically.

The O-B Type-M shoe retains all the advantages of O-B Type-L shoes. The pivotal center of the shoe is located in the center line of the wearing surface, eliminating any tendency for the shoe to tilt because of friction between the wire and the shoe. The shoe is always held in full contact with the wire.

Keep your locomotives in service for longer periods of time with double shunt O-B Type-M Trolley Shoes. Let your O-B representative tell you more about them, or write to Ohio Brass for more information. Use the coupon!

OHIO BRASS COMPANY
380 North Main Street
Mansfield, Ohio

Gentlemen:
I'd like further information about this Type-M Trolley Shoe. Send it to the following address:

NAME _____

TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

Ohio Brass
MANSFIELD  OHIO, U. S. A.

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

O-B TAP CONTACTS LICK ANY POWER TAPPING PROBLEM



PLIER TYPE

CONTACT
BALL ROD



With these six different contacts on hand in your stock room, you can use your new O-B Form-H Fused Taps to lick any power-tapping problem. Of course, your operation may not call for some particular one or another of these contacts, but from the assortment of six you will find the right contacts for use with your portable, mobile and semi-permanent machinery.

All these contacts are made to fit the new O-B Form-H Fused Tap. Because of this interchangeability, you need to stock only one style tap to use any of the contacts.

Increase the utility of the fused tap in your mechanized mining. Ask your O-B representative how the Form-H Tap, and a choice of six handy contacts, can save time and increase safety in your mine. He has a complete set of these contacts, as well as the new Form-H tap, ready to show you.

LONG HOOK TYPE



CLAMP & GLIDER TYPE



SPRING TYPE



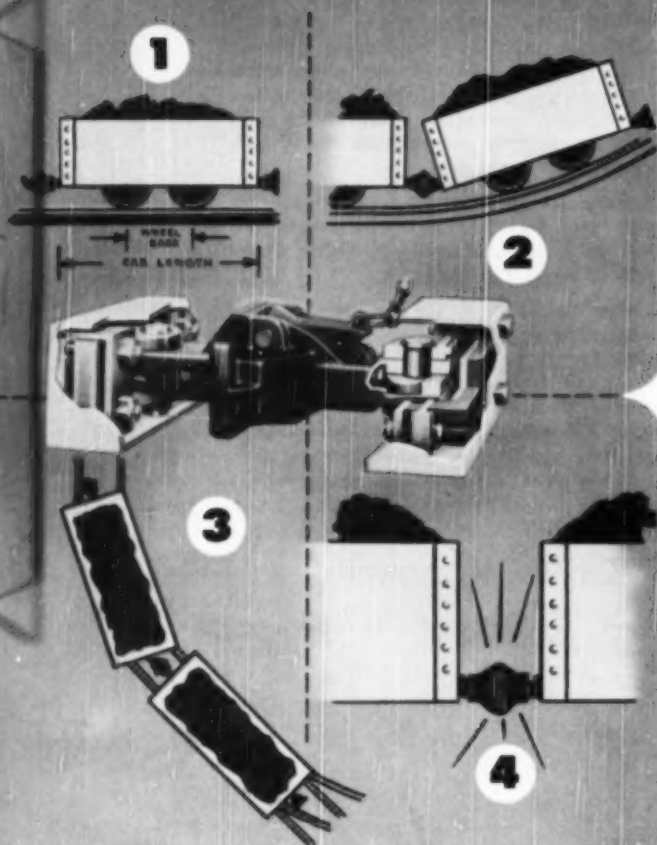
HOOK TYPE



FORM-H FUSED TAP WITH
HOOK TYPE CONTACT

Built for work in tight spots

O-B COUPLERS PERFORM EASILY IN DIFFICULT HAULAGE CONDITIONS



HAULAGE WAYS Jr.

1 Many mine cars have short wheel bases so that they can operate over short curves. However, this short wheel base makes it easy for cars to zigzag. That's why O-B Automatic Couplers are your best coupler choice; they prevent zigzag, stabilize the cars, and keep them in center-to-center alignment.

2 Mine haulage ways frequently have sharp dips or knuckles in the roadbed. These vertical curves offer no operating difficulty when O-B Automatic Couplers are used. Flexible rubber draft gear in each coupler mounting permits 14 degrees of vertical movement between the cars.

3 There's no delay for coupling on short radius curves when cars are equipped with O-B Automatic Couplers. At crossovers near loading points, for example, empty mine cars stand in the curve until picked up by the gathering locomotive. O-B Automatic Couplers join on impact in these curves, because of their extra-wide gathering range.

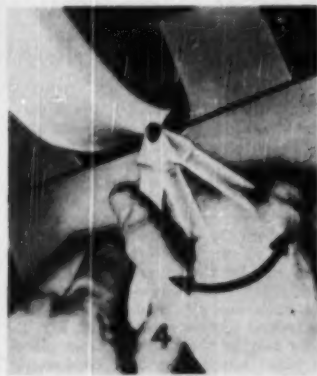
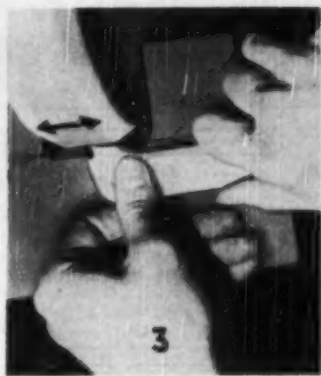
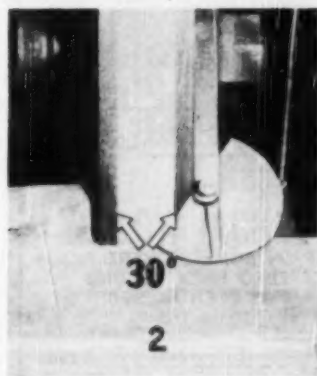
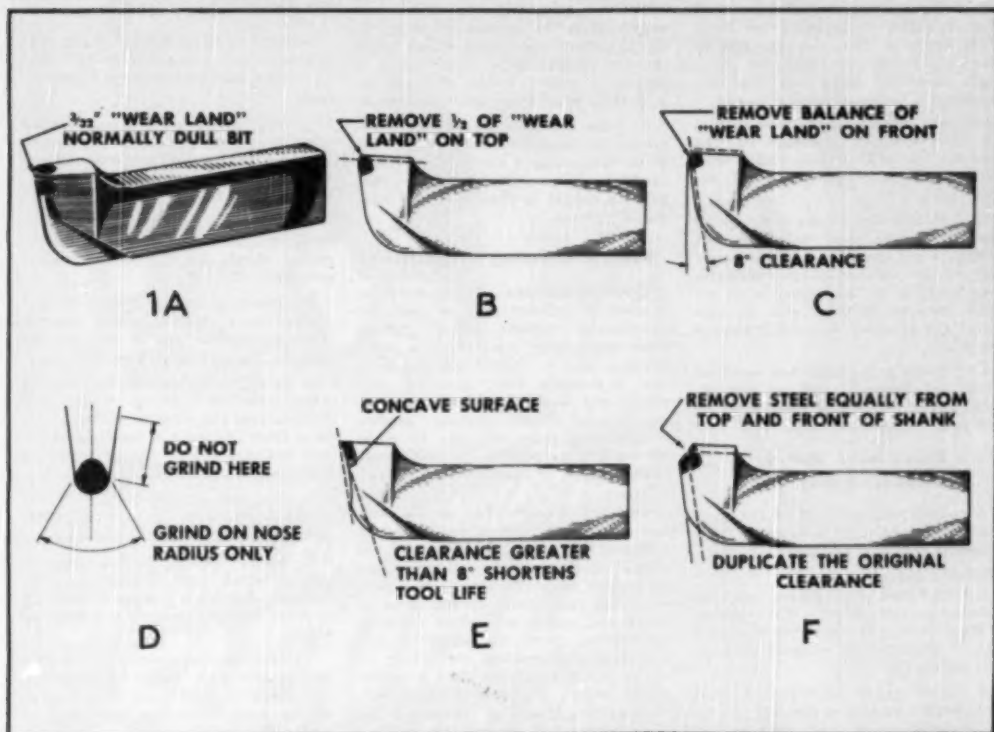
4 Loaded cars cause heavy impacts on their couplers as the trip moves out to the tipple, and it takes a sturdy coupler to resist this repeated bumping. O-B Form-8 Automatic Couplers, with rubber draft gear, can absorb impact blows as high as 100,000 pounds.

Talk these points over with an O-B representative. He'll show you other reasons why O-B Automatic Couplers are a necessary part of efficient high-speed haulage.

Ohio Brass
MANSFIELD  OHIO, U. S. A.

CANADIAN OHIO BRASS CO. LTD. NIAGARA FALLS, ONT.

How to Sharpen Carbide-Tipped Cutter Bits



SHARPENING carbide-tipped mining tools at the proper time—before the tips become excessively dull—not only is easier and faster but will provide longer tool life at minimum cost and lessen the burden on the mining machine, reports the Carboloy Co., Detroit 32, Mich. The following method of sharpening cutter bits and the accompanying general grinding principles are recommended by the company for users who wish to get the most

out of their carbide-tipped mining tools.

Sharpening Normally Dull Cutting-Machine Bits

When the front of the carbide tip on cutter bits of the type illustrated shows a "wear land" (or "flat") approximately 3/32-in wide (Fig. 1A), the bits should be removed and sharpened as follows:

1. Form a 30-deg angle or chamfer on each side edge of the silicon-carbide wheel with a star dresser (Fig. 2), since it is almost impossible to avoid grinding a concave surface on the end of a cutter bit with a straight grinding wheel.

2. Remove one-half of the wear land by grinding the top of the tip on the silicon-carbide wheel (Fig. 1B).

3. Grind the top of the tip against

the face of the wheel, using a side-to-side movement and keeping the tool in constant motion (Fig. 3).

4. Remove remainder of wear land on nose radius by grinding the front of the bit (Fig. 1C). Set the table to provide a 8-deg end clearance. This angle then will blend into the side clearance if this method is followed.

5. Grind only the area shown in Fig. 1D. Unnecessary grinding of the steel on the side of the shank may load wheel and necessitate its redressing.

6. With tool flat on the table, grind one-half of the nose radius on one 30-deg wheel chamfer and the other half of the radius on the opposite chamfer (Fig. 4). Swing tool in an arc while moving it from side to side across the chamfer, to avoid grooving the wheel.

7. Always grind only the specified 8-deg end clearance and you will obtain greater tool life between regrinds and more grinds per tool.

Excessively Dull or Chipped Cutter Bits

A considerable amount of the steel shank generally must be removed from excessively dull or chipped cutter bits, following this procedure:

1. Grind back steel shank, using an aluminum-oxide wheel. The amount of steel to be removed depends on the size of the worn or chipped area on the carbide tip.

2. Grind equal amounts of steel from both the top and front of the tip to a depth about half that of the

chipped area (Fig. 1F), but don't grind the carbide tip on an aluminum-oxide wheel.

3. Don't grind the steel shank any deeper than the amount of wear on the tip, since that would either leave the tip projecting without sufficient support or waste carbide when the tip is ground back flush with the shank.

4. Once the steel shank has been ground as necessary, sharpen the tip as in sharpening a normally dull tool (above). When sharpened, the carbide tip should be flush with the steel shank.

General Grinding Suggestions

Grinding Machine—Any pedestal or bench-type grinder may be used for sharpening carbide-tipped mining tools, preferably one taking a 10-in wheel or larger. Use a U-shaped table rest if possible when grinding both cutter and finger bits, as an aid to maintaining proper clearance angles. A U-shaped table rest can be made by welding extensions onto the rectangular type of table generally used.

Grinding Wheels—For carbide tips, use a silicon-carbide wheel, 10 in in diameter or larger. No more of the shank steel than necessary should be ground on a silicon-carbide wheel, since the steel loads up this type of wheel and causes it to glaze. Glazing, of course, slows up grinding and necessitates redressing the wheel.

For removing excess steel from the shank when required, a 24-grit aluminum-oxide wheel is recommended. However, never attempt to grind a

carbide tip on an aluminum-oxide wheel, since the aluminum-oxide grains are too soft and too coarse to cut cemented-carbide metal.

General Considerations—These suggestions are applicable to grinding all types of carbide-tipped mining tools:

1. Dry grinding is recommended over wet grinding, since dry grinding provides good visibility, more uniform temperatures on the carbide tip and longer wheel life.

2. When dry grinding is used, an exhaust system for adequate dust removal should be installed wherever possible.

3. In wet grinding, a full flow of coolant must be constantly directed into the carbide tip to prevent the carbide from being damaged.

4. Keep the tool in constant motion when grinding—moving it back and forth across the wheel's grinding surface. Such motion will result in faster and cooler grinding and will prevent grooving of the wheel.

5. Use the entire surface of the wheel to maintain the wheel's profile and keep redressing to a minimum.

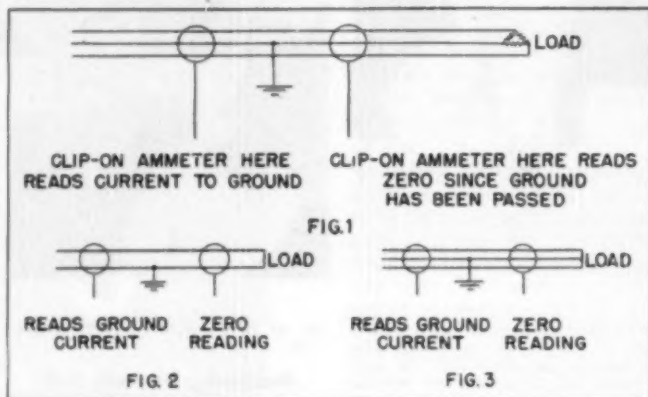
6. Never cool a carbide-cemented tool in water since it may crack the carbide. Permit a heated carbide tip to cool naturally, or in a stream of air.

7. Maintain recommended clearance angles each time a tool is sharpened. Grinding too much steel from the end of the tool leaves too little support under the carbide tip.

A Simple Method for Locating Ground Faults

IN SOME INSTANCES where a current flows to ground, a clip-on ammeter or tong tester can be used to advantage in measuring this ground current to locate the fault, a recent issue of the *Westinghouse Maintenance News* reports. If the circuit conductors are insulated and are small enough so that the clip-on ammeter core can be placed around all three conductors in a 3-phase motor circuit, the ammeter will read the resultant or ground current as shown in Fig. 1.

By moving the ammeter from place to place along the three conductors (placing it around all three of the phase conductors each time), the ground can be readily located. Grounds on two- and three-wire single-phase circuits can be located in a similar manner. By clipping around both conductors of a two-wire circuit, as shown in Fig. 2, or around all three conductors in a three-wire circuit (Fig. 3), only the ground current will show up on the instrument. This current will disappear when the ground point is passed when moving the instrument toward the load.



This method is superior to measuring the individual phase currents, as it measures the abnormal current only. If the ground current happens to be small, it cannot be detected by

measuring the individual phase currents. Then, too, unbalanced phase currents not resulting from a ground will balance out to zero with this method.



U.S. ROYAL GOLD CABLES ARE
FLEXIBLE
AND EASY TO SEE

7 Reasons why these YELLOW JACKET Cables mean Safety!

Trailing Cables have to be tough to withstand the flexing and twisting they must take while reeling in and out.

Seven grueling laboratory tests, all of them tougher than actual conditions, guarantee U. S. Royal's resistance to abrasion, cutting, heat, moisture, cold, impact—and its ability to stand constant flexing. The bright yellow color gives U. S. Royal Gold the highest visibility. To get your copy of the new U. S. Royal Gold descriptive folder write Electrical Wire and Cable Department, U. S. Rubber Company, Rockefeller Center, New York 20, N. Y.



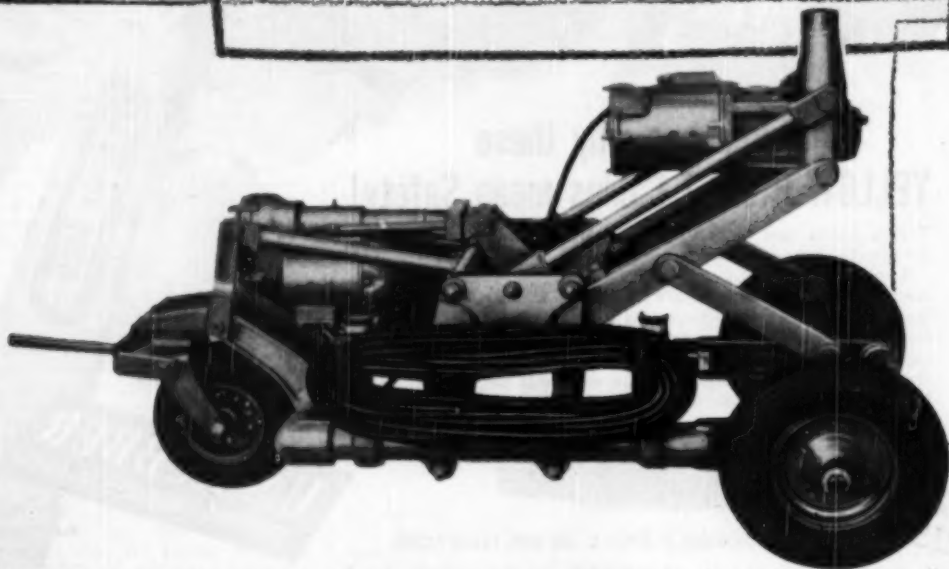
Available in Black or the new Yellow Jacket

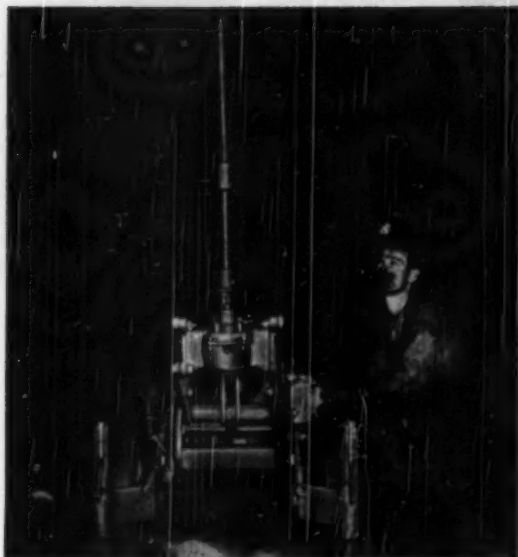
U. S. ROYAL GOLD MINING MACHINE AND LOCOMOTIVE CABLES



NEW MOBILE ROOF BOLTING UNIT

drills bolt holes, runs nuts





Drilling hole for suspension roof bolt



Tightening nut on roof bolt

For fast and economical installation of suspension roof bolts, Chicago Pneumatic has developed this electrically-operated combination unit for drilling bolt holes and running nuts.

In an Indiana mine, where 1½" diameter holes are drilled to a depth of 46", actual tests show an average, for the complete operation of drilling, inserting expansion bolts and nut running, of less than five minutes per bolt. Even where boulders were encountered, holes were drilled without difficulty and with no appreciable wear on the bit.

SPECIAL FEATURES

- One motor drives both the auger and the nut runner.
- A built-in slip clutch permits adjustment of nut running torque and protects motor against stalling.
- This motor can be shifted to permit withdrawal of drill steel without moving the unit.
- The feed motor is also protected against stalling by a built-in slip clutch.

SPECIFICATIONS

Overall height of unit in lowered position	28"
Weight	650 lbs.
Overall length, less handle	72"
Drilling speed (loaded 450 R.P.M.)	4 feet a minute
Maximum nut-running torque	300 lbs. ft.

Write for complete information



**CHICAGO PNEUMATIC
TOOL COMPANY**

General Office: 4 East 40th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

ADVERTISEMENT

From Forge to Lamps



Operators of the Fork Mountain Coal Co., Fork Mountain, Tenn., report that since Kennametal U-4 Bits have been in service, the job of sharpening and hard-tipping bits has been eliminated. The blacksmith now has an easier job—taking care of lamps. The superintendent, Tom Jones, sharpens the bits in his spare time.

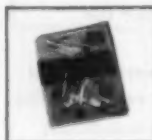
Powerful New Bit For Drilling Hard Rock



A new bit that Kennametal has recently developed drills the hardest rock that most strip miners will encounter. It has a solid alloy steel body, is set with regular Kennametal Mining Machine Bits. The bit is for heavy impact service—drills ground interspersed with boulders, laminated sandstone, limestone, hard shale, and hard slate.

Write for Bulletin M-135.

New Catalog Available



Kennametal recently issued a new catalog. It illustrates and describes twelve new tools as well as the regular line. The catalog contains the latest and most complete information available on carbide cutting and drilling tools for the mining industry.

Write for Catalog M-6.

Bit to Put Bolt Holes in Hard Roof



New FD bit with Kennametal cemented carbide cutting edge permits use of coal drills to drill bolt holes in hard roof. Bit gives steady drilling in laminated sandstone, slate, and other hard materials.

Our representatives will be glad to work with you and give you suggestions on how to mount your drill.

Write for Bulletin M-105. Kennametal Inc., Latrobe, Pa.

Kennametal U-4 Bits



**Boost Production 22%
at Fork Mountain Coal Co.**

U-4's (on 3588 Machines) cut 250 places or 30,000 tons of coal in the Regal Seam—reduce bit cost to .41 of one cent per ton.



Tom Jones, who is superintendent of the Regal Mine, Fork Mountain Coal Co., Fork Mountain, Tennessee, says that without any other change in mining equipment, he has made an increase of 22% in coal production by using Kennametal U-4 Bits.

A boney streak 2" to 6" thick in the cut causes a serious cutting problem. Hard-tipped bits had been used, but this proved to be a costly solution, as welding equipment, acetylene, oxygen, hard-tipping material and labor were costly and bit changes even with hard-tipped bits were necessary every place.

U-4 Bits have averaged a full shift or more of service between changes and they increased the number of places cut per machine shift from 7 places to 9 places or approximately 35 tons per machine shift. Bit cost has been reduced to .41 of one cent per ton and other savings have been made on material, labor, and machine repair.

While conditions are different from mine to mine, the cost savings made by Kennametal Bits is surprisingly consistent. You will not get the same results as were obtained at the Regal Mine—they could be even better. Won't you get in touch with a Kennametal representative today and find out how you can save—through an actual DEMONSTRATION. Our representative will be glad to make it, at no cost or obligation.

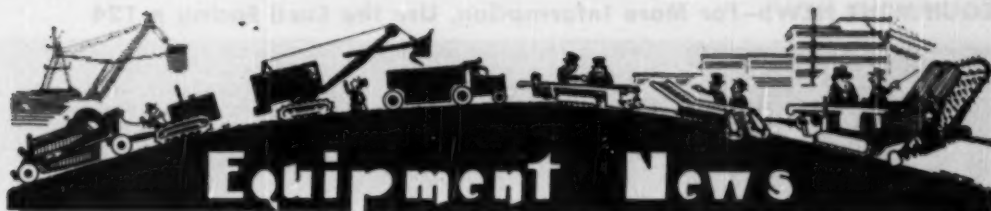
Write Kennametal Inc., Latrobe, Pa.

KENNAMETAL®



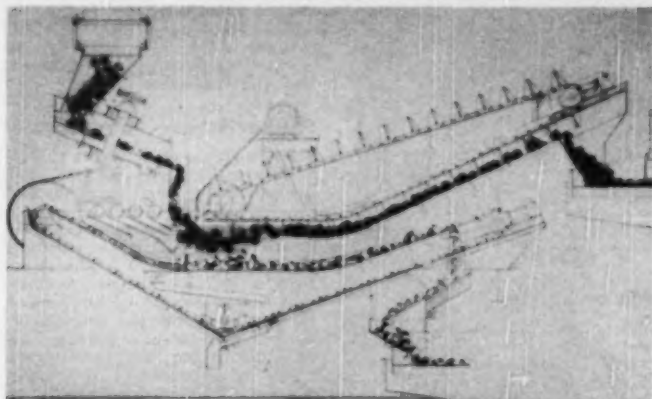
DRILL BITS • MACHINE BITS • STRIP BITS • ROCK BITS

***Specialist in Coal Cutting and Coal Drilling
with Cemented Carbide Tools***



Equipment News

European Cleaning Process Offers High Efficiency (1)



Manufacturing rights to the Tromp process, long a leading European coal-cleaning process, have been secured by the McNally Pittsburg Mfg. Corp. and will be marketed as the McNally

Tromp Dense Media System. Built for either three-product or two-product (above) separation, the process uses a coarsely ground magnetite or other heavy iron-bearing media with a

high settling rate which, with the fluid-bath characteristics and the short path of separation, offers a high efficiency approaching 100%, the company reports.

Design of the unit permits a consistently sharp separation of floats and sinks through horizontal currents only, a high fluidity in the bath and low velocity requirements of the heavy liquid, it is said. An automatic density regulator maintains absolute control at a predetermined specific gravity without operator attention. The media is introduced at three different elevations and flows in a straight horizontal direction, with the sinks, floats and middlings removed by scraper conveyors traveling in the same direction. Because of the increased particle size of the coarsely ground media, spray removal and recovery are greatly simplified, the manufacturer states. The system does not depend on magnetic recovery of the media, although it may be utilized if desirable, and various media may be used, it is said.—McNally Pittsburg Mfg. Corp., Pittsburg, Kan.



Portable Artificial Respirator (2)

New "Pneolator automatic breathing instrument" may be safely used for victims of any kind of asphyxiation and will perform artificial respiration automatically and more efficiently than by the manual method, according to Mines Safety Appliances Co. For patients not breathing, one of two valves administers oxygen at regular intervals on an automatic cycle with a positive preset pressure that can be varied with conditions. For patients breathing, a second valve that automatically interchanges with the

first lets oxygen flow only when the patient inhales. The entire unit weighs 41 lb with a carrying case that includes a ½-hr supply of oxygen. An additional oxygen supply can be connected without disturbing the regular tank.—Mines Safety Appliances Co., Pittsburg 8.



Large-Capacity High-Speed Trailer (3)

Designed to permit large-capacity high-speed haulage, the new Athey PD-20 trailer was matched and built for use with the newly announced Caterpillar DW 20 diesel tractor, which features a new 6-cylinder 276-hp engine for travel speeds from 2.16 to 20 mph. The semi-bathtub-type design has modified tapered sides and one low side for easier loading and discharge, and features greater stability in traveling and unloading, along with an all-welded construction of high-strength steel that emphasizes impact resistance, the maker says. The body can be equipped to dump either to the right or left, operating by hydraulic power.—Athey Products Corp., Chicago 38.

For More Data on These and Other Items in This Section, Use the Card Facing p 124

EQUIPMENT NEWS—For More Information, Use the Card Facing p 124



Mine Locomotive Lamps (4)

The first to be designed specifically for mine-locomotive headlights, two new 150-watt General Electric lamps feature greater beam candlepower, longer life, more concentrated beam and more sturdy construction, with a face 5% in in diameter, according to G. E. The 32-v lamp has exceptionally high performance characteristics, producing a beam of 100,000 candlepower, approximately three times that of a sealed-beam automobile headlamp, and a beam spread of 12 deg, both vertically and horizontally, with a rated life of 800 hr, the maker says. The 115-v lamp is intended for use in headlights equipped with resistors for only this voltage. Its beam of 17,000 candlepower has a vertical spread of 16 deg and horizontal spread of 33 deg, with rated life of 1,000 hr. It features a mount of shock- and vibration-resistant construction. With mine power circuits of 275, or 500 v dc, proper resistors must be used in series with both lamps. List prices are \$2.50 for the 32-v, and \$3.60 for the 115-v lamp.—General Electric Co., Lamp Dept., Nela Park, Cleveland 12.



Automatic Steam Cleaner (5)

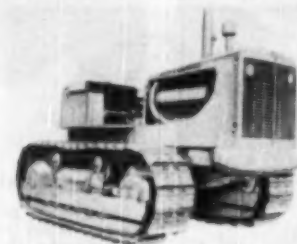
New improved "General" heavy-duty vapor steam-cleaning machine features a fully automatic safety-protected system that permits one-man operation, while at the same time accelerating the cleaning process, the maker says. The unit generates full operating pressure within 90 sec and automatic controls maintain operation and mixing of the cleaning compound at its peak, thus eliminating time-consuming adjustments and pre-mixing of compounds. The unit is available in stationary or portable

models of 100- or 200-gal capacities, with portable models mounted on a free-rolling carriage. Various attachments may be connected without stopping the motor.—General Equipment Div., Steris Mfg. Co., Newark 5, N. J.



Motor Starter (6)

Improved Westinghouse manual starter, the Motor Sentinel Class 10-023, specially equipped with an indicating light to show when the motor is running, is said to be especially useful for starting and protecting small ac and dc motors used with fans, pumps, compressors, etc. Available as double-pole switch with ratings up to 1 hp 250 v ac or dc, the unit features quick-make quick-break action to insure rapid and positive operation provided by an over-center self-indicating toggle mechanism, and a positive bimetallic overload protection that permits safe-capacity overloads but automatically disconnects the motor on any sustained or damaging overload. Proper selection of the replaceable heater provides sufficient time delay for small-motor starting.—Westinghouse Electric Corp., Pittsburgh 30.



Track-Type Tractor (7)

Allis-Chalmers' latest torque-converter-equipped tractor, the HD-20, features 41,800 lb of properly balanced weight, long, wide, sure-gripping tracks, and a new 2-cycle GM 6-110 diesel engine for easy handling of the toughest jobs in stride, the maker says. The 660-cu in engine

provides the HD-20 with ample power for longer life, less maintenance and increased production, and maximum horsepower can be utilized regularly and maintenance held to a minimum, it is said. A three-stage hydraulic torque converter is reported to eliminate most gear shifting and keeps the tractor working smoothly at higher average speeds. Operating adjustments, maintenance points and major assemblies are located and designed to speed necessary care, maintenance and repair, and removal or replacement of major assemblies can be made without disturbing adjacent parts.—Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

Shaker-Screen Lubricant (8)

As an answer to a difficult lubrication problem presented in coal preparation for many years, the new Gulf cam grease, a high-quality, smooth-texture, mixed-soap-base grease, has been developed especially for the lubrication of shaker-screen cams, according to the manufacturer. Gulf cam grease has excellent metal-adhesion properties and will cling to bearing surfaces at operating temperatures of 250 deg F and higher, which shaker-screen cams and/or eccentrics often develop because of their construction, and operating conditions, Gulf reports. The new cam grease is easily applied with a compression grease cup, pressure gun or automatic lubricating system.—Gulf Oil Corp., Pittsburgh 30.



Centrifugal Pumps (9)

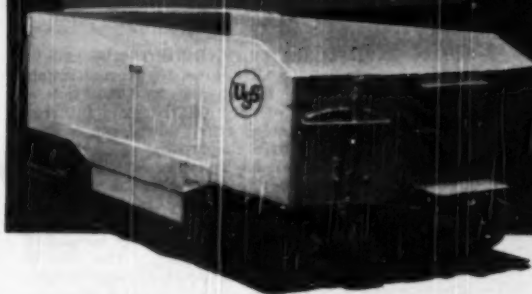
A new Ingersoll-Rand line of completely new multi-stage centrifugal pumps for high-pressure applications to 1,200 psi and capacities to 1,600 gpm, known as the Class HMTA, offers 3-, 4-, 5- and 6-in sizes with from 3 to 9 stages and are exceptionally efficient, easy to maintain and dependable, according to the manufacturer. Features cited for the new design are its cylindrical-bore horizontally-split casing, and compact unit-type rotor assembly. A 16-p Bulletin 7233 offers full details of design, application and operating characteristics.—Ingersoll-Rand Co., New York 4.

Dust-Tight Feeders (10)

To provide protection against clogging by excessive hopper spillage or heavy dust conditions, a dust-tight model has been added to the standard line of Syntrol heavy-duty "Vibra-Flow" vibratory feeders. In the new

If you're in the dark ... about modern mine car construction

*Here are some
illuminating facts
about U-S-S COR-TEN*



If you want cars that withstand rough treatment, use Cor-Ten steel.

U-S-S Cor-Ten has a yield point of 50,000 lbs. per sq. in., $1\frac{1}{2}$ times that of plain or copper steel. It has greater resistance to shock, abrasion and wear. It has 60% greater resistance to fatigue. That's why Cor-Ten cars can absorb abuse that would put cars of other construction right out of service.

If you want large capacity cars that will last, use Cor-Ten steel.

U-S-S Cor-Ten permits the greatest increase in size with the least increase in weight.

If you want cars with high resistance to corrosion, use Cor-Ten steel.

U-S-S Cor-Ten has 4 to 6 times greater resistance to atmospheric corrosion than plain carbon steel. Always important, this advantage is especially vital when cars operate under adverse conditions.

If you want cars that are lighter in weight, use Cor-Ten steel.

U-S-S Cor-Ten can be used in reduced thicknesses to give you lightweight construction. Yet, because of its superior physical properties, Cor-Ten properly used in reduced thicknesses will be just as strong as the heavy plain carbon steel construction it replaces.

If you want cars that pay dividends, use Cor-Ten steel.

U-S-S Cor-Ten cars require less maintenance. Out-of-service time for major repairs is greatly reduced because of Cor-Ten's proved ability to stand up under severe conditions. Of the 25,776 Cor-Ten cars now in use, 55% have been built on repeat orders—after the original Cor-Ten cars proved in service how much better they would perform. They are operated by 63 of the country's large coal mining companies.



U·S·S HIGH STRENGTH STEELS

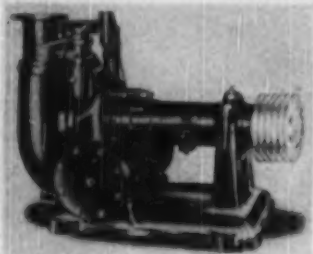
U·S·S COR-TEN · U·S·S MAN-TEN · U·S·S TRE-TEN

UNITED STATES STEEL

6-1510

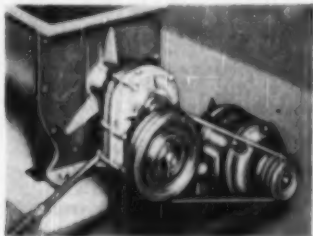
EQUIPMENT NEWS—For More Information, Use the Card Facing p 124

design the working parts, the leaf springs, armature and core, are covered by gasket-sealed plates bolted to the magnet casting. Addition of the sealed protection does not affect the unit's feed rate, which ranges up to hundreds of tons per hour of fine or coarse materials, the maker says. Literature is available from Syntron Co., Homer City, Pa.



Centrifugal Sand Pump (11)

New Wilfley Model K heavy-duty centrifugal sand pump, said to be designed for higher efficiency and trouble-free operation, features a two-piece frame construction that permits the rubber-lined or special-alloy intake chamber to be replaced readily. A new improved patented check valve eliminates leakage and provides longer valve life, better bearing protection and easier removal of check valve and associated parts, the maker reports. Model K is available in direct-connected, belt-driven and overhead V-belt-driven types in nine sizes from 1- to 8-in. discharges. Rubber-covered wear parts are available for all sizes and are interchangeable with the hard-iron parts. Catalog 200 offers full operating details and specifications.—A. R. Wilfley & Sons, Inc., Denver, Colo.



Speed Reducers (12)

A new Torque-Arm reducer for output speeds from 115 to 330 rpm is said by the manufacturer to be the first and only shaft-mounted reducer designed for this speed range. The new single-reduction unit, being produced in four sizes covering capacities up to 27 hp, features ease and economy of installation, attributed by the maker to shaft mounting which eliminates special engineering, the cost of a foundation, flexible cou-

plings, sliding base, and the time-consuming operation of lining up. While this new reducer can be driven through any V-belt or flat-belt drive, the designers recommend stock Taper-Lock sheaves for facility of installation or removal and for maximum operating efficiency. Any required

output speed can be obtained with stock sheaves properly related in size, with speed variations accomplished simply by changing sheave sizes, it is said. Bulletin A-602, providing full information and easy-to-use selection tables from Dodge Mfg. Corp., Mishawaka, Ind.



(13) FLUORESCENT SCREW-IN BULB inserted into an ordinary lamp socket will convert hot incandescent work lights to cool fluorescent units, the maker says. Existing sockets remain as originally installed to give the same flexibility, plus the 300-deg rotation of the Lite-Mite Bulb shade for even-more-efficient focusing. The unit contains two 4-watt fluorescent lamps and all control components entirely within the 2x6-in. shade, which is hardly larger than the ordinary incandescent lamp yet produces over 400% more light for equal wattage, it is said. Priced at \$8.67 each per set or more. Bulletin offers full details.—Stocker & Yale, Marblehead, Mass.

(14) REMOTE - CONTROL HYDRAULIC RAMS and pumps, known as "Re-Mo-Trol," have been developed for use where limited space or other difficulties make the use of self-contained jacks impossible, and are available in seven models with capacities from 10 to 100 tons. With the Re-Mo-Trol, the operator can lift, pull or push from a distance and in any direction—up, down, sideways or at an angle. Full details from Templeton, Kenly & Co., Chicago 44.

(15) PORTABLE FM RADIOTELEPHONE—The Doolittle "Littlefone" is a complete portable two-way radio station in one compact unit, ready for instant voice communication and powered by self-contained storage batteries, which may be recharged from 6-v car battery or 115-v ac. Available in hand-carry or back-pack types, the 2-watt models weigh only 14 lb and reportedly provide good communication between portable units and a fixed station or mobile equipment. Bulletin available from Doolittle Radio, Inc., Chicago 36.

(16) BUCKET-ELEVATOR EFFICIENCY is improved with Beaumont Beucalloy "Uni-Cast" buckets which

Equipment Shorts You'll Want to Check

are cast integrally with a single link of chain and cannot loosen and fall off, the maker says. They reportedly are easy to replace—costing no more than a bucket with single link of chain—and have no raised surfaces or projecting bolt heads to retard discharge of material. Five standard sizes are available, made of heat-treated alloy steel.—Beaumont Birch Co., Philadelphia 2.

(17) A THREAD RESTORER said to be especially suited for reconditioning closely spaced studs and bolts has a swing of only 25/16 in and features adjustable cutting jaws that can be fitted by a simple twist of the handle to any-make thread of 1/4 to 1 in. The jaws may be engaged at the bottom of the threaded section and turned out toward the top, leaving clean end threads in which nuts may be started and run down easily. The tool is completely self-contained and weighs only 1 1/4 lb. Other units are available for threads up to 4 in.—Buckingham Mfg. Co., Inc., Binghamton, N. Y.



(18) PORTABLE WINCH-HOIST built for rigorous service, the new "Lug-All" 1 1/2-ton alloy winch-hoist offers a 30:1 power ratio, fully tested to 100% overload, yet weighs only 8 1/2 lb. Standard features include oiled-for-life bearings, and a reversible handle that acts as a "safety valve" to protect the user and can be removed in 10 sec to leave the set-up tamperproof. A combination of three swivel hooks and a built-in pulley block permit work to be done



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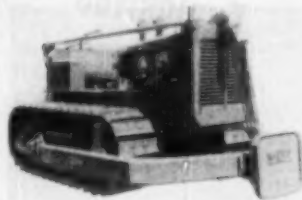
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around corners, and locking is positive and automatic. Priced at \$33.50, guaranteed for 1 yr.—*The Lug-All Co., Wynnewood, Pa.*

(19) **IMPROVED CABLE** — RoFlex non-metallic sheathed cable now is manufactured with a new gray finish and offers vastly improved workability, Rome Cable says. The new finish is non-flaking and will not dust off or become tacky at high temperature, and is smooth for easier pulling, as well as pleasant and clean to handle, it is reported. An improved over-all braid of combined glass and pre-saturated yarn is said to assure high resistance to rot and mold, and for easy identification the cable's surface is printed with size, voltage and name.—*Rome Cable Corp., Rome, N. Y.*

(20) **CLEANER, FASTER GREASING** of open gears is possible with Keystone Grease No. 32, an extremely tenacious and highly adsorptive grease specially produced for open gears and supplied in cartridge form to fit a specially nozzled gun applicator, which ribbons the grease and frequently permits application while gears are moving, the maker says. No. 32 grease is water-repellent, features high resistance to removal, a melting point above 400 deg F and retention of plasticity with temperatures below freezing.—*Keystone Lubricating Co., Philadelphia 32.*



(21) **A NEW PUSHER** for use with the Allis-Chalmers HD-19 tractor is available as a complete unit or as an attachment, weighs approximately 725 lb complete, is heavily reinforced, sturdily constructed and designed to work with practically all types of scraper push plates, says the maker, Baker Mfg. Co. Full information is available from Baker-Allis-Chalmers dealers, or from Baker Mfg. Co., Springfield, Ill.

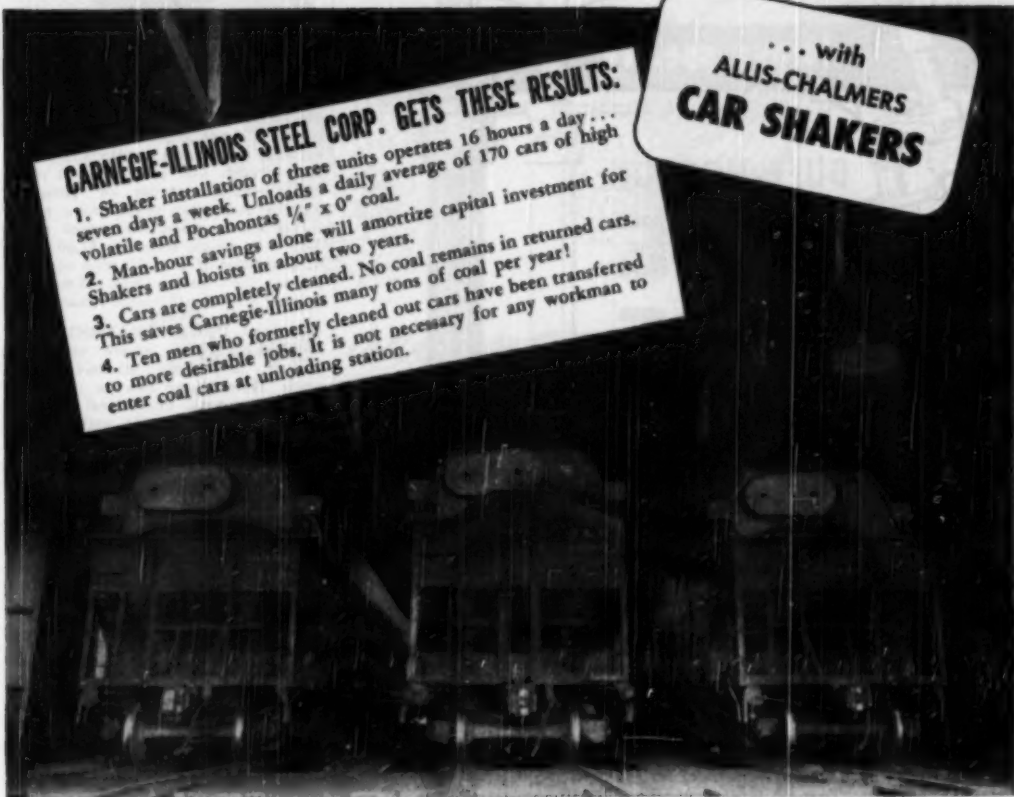
(22) **REFILLABLE ION-EXCHANGE UNIT**, said to deliver water equal in chemical quality to triple-distilled from an ordinary faucet, was designed for small-quantity uses where more elaborate equipment would be impractical, such as soil analysis, photography, general laboratory work, and for water of extremely high quality for truck and auto storage batteries. The smallest model made by the company, the "Filtr-Ion" will deliver about 10 gal of laboratory-quality water per refillable unit, it is said.—*La Motte Chemical Products Co., Towson, Baltimore 4, Md.*

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(23) A NEW ONE-PIECE 1-oz all-plastic safety goggle, designed to fit all faces, is made of impact-resisting plastic for protection in hand-tool and machine operations. It is "optically correct," offers an exceptionally wide-angle vision and can be worn over most standard types of personal glasses and most prescription spectacles and goggles, the maker says. This AO goggle sells for \$1.50 each in quantities of 1 to 74, with reduced prices for larger lots.—*American Optical Co., Southbridge, Mass.*

(24) FOR POWER-TRANSMISSION INSTALLATIONS where space is limited, new Falk all-steel right-angle Motoreducer can be used for either horizontal or vertical applications and is available with output shaft single- or double-ended. The unit has an input speed up to 1,750 rpm or higher and range of 1 to 50 hp. Bulletin 3110 offers full details.—*Falk Corp., Milwaukee 8, Wis.*

(25) FOR WELDING CABLES, new Tweco "Lug-Set" block and punch permits rapid attachment of new "Twecolug" copper lugs and "Lug-Set" splicers by mechanical means, without soldering or heat. Bulletin SL-51, giving full details and prices, is available from Tweco Products Co., Wichita 1, Kan.

(26) OPEN-GEAR SPRAY VALVE permits spraying either grease or oil onto open gearing, slide surfaces or other areas to apply a measured amount of lubricant at regular intervals. The unit can be operated wherever compressed air is available, either as an addition to a regular Farval Dualine lubrication system or in a complete system of spray valves served by either a manual or an automatic pumping unit. Bulletin 60 offers detailed data.—*The Farval Corp., Cleveland 4.*

(27) ISOLATING PASTE FOR SELECTIVE HARDENING, known as "Isopac," has been improved in stability so that it now can be kept on hand in large containers at lower cost or for intermittent use. Isopac is used to keep desired sections soft while the rest of the work piece is case-hardened and can be used with any conventional hardening process, with good results even on high-carbon steel, the maker says.—*Dresfs Chemical Laboratories, Inc., Brooklyn 2.*



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(28) **BELT-CONVEYOR DESIGN**, construction and equipment are thoroughly covered in the 64-p Engineering Data Book ID-481-A issued by the Industrial Div., Continental Gin Co., Birmingham 2, Ala. The booklet offers specifications, dimensions, weights and prices on the full line of Continental idlers, pulleys, accessories, etc., and also includes considerable engineering data helpful in design and installation of belt-conveyor systems.

(29) **"HYDRAULIC FUNDAMENTALS AND INDUSTRIAL HYDRAULIC OILS,"** a new 44-p technical bulletin offering fundamental information on hydraulic systems, maintenance, trouble-shooting, and selection of proper fluids is now available through the Sun Oil Co. A complete revision of a similar bulletin, this new B-4 edition features specially prepared phantom and cut-away drawings illustrating functions of base types of valves, pumps, hydraulic motors, torque converters, etc. The company recommends the bulletin as a valuable training aid or guide for maintenance supervisors, operators and apprentices, and offers it to management in quantity free of charge for this purpose. Individual copies are available without cost from the Sun Oil Co., Philadelphia 3.

(30) **ROUTING A TRIP** by 11 different methods of route selection with electric track switches is shown and explained by diagrams contained in Catalog Sheet 850 available from Cheatham Electric Switching Device Co., Louisville 9, Ky.

(31) **COAL CLEANING**—For those interested in producing a cleaner, more salable product, bulletin from Western Machinery Co., San Francisco 7, describes WEMCO Mobil-Mills, or prefabricated heavy-media separation plants furnished in capacities up to 350 tph. Operation, advantages and specific applications of these units are covered, along with tables of capacities, dimensions and requirements for power, water and media.

(32) **SINGLE-DRUM HOISTS** — A new 16-p bulletin (76-X) released by Joy Mfg. Co., Pittsburgh 22, describes the complete line of Joy single-drum multi-purpose hoists, with complete data and specifications for units with capacities from 500 to 3,500 lb and driven by Turbinair, Pistonaire, electric or gasoline engines. A handy "Select-O-Hoist" chart simplifies the choice of proper hoist.

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BULLETINS—Cont'd

(33) DRY-TYPE TRANSFORMER—A new 23-p booklet, B-4428, entitled "Westinghouse Dry-Type Transformers," outlines why dry-type transformers are safer and less expensive to install and maintain. Types of air-cooled transformers for every use are illustrated, from small units up to power centers as large as 10,000 kva, including sealed submersible dry-type transformers for installation underground. Available from Westinghouse Electric Corp., Pittsburgh 39.

(34) MOVIE OF STEEL MAKING—A 22-min motion picture which explains the making of steel from the mining of iron ore and coal to the rolling of semi-finished and finished products now is available for group showings from Kaiser Steel. Entitled "Strength In The West," the 16-mm film, in color and sound, can be obtained free by writing the Public Relations Dept., Kaiser Steel Corp., 1924 Broadway, Oakland 12, Calif. The film fully illustrates the various facilities and processes involved in iron and steel production.

(35) MACHINE-SHOP FACILITIES, engineering and service available from The Bowdill Co., Canton, Ohio, are illustrated and described in new booklet "Bowdill Facilities for Industry." More than 200 customers in the region are using the Bowdill organization for construction, repairs and rebuilding of equipment requiring precision machine work and scientific heat treating, the booklet says.

(36) DERRAIL CONTROLS—Bulletin 350 from Cheatham Electric Switching Device Co., Louisville 9, Ky., illustrates the layout and operation of three types of electrically operated derail controls for protection of men and equipment in main-line haulage. Details are given on fully automatic, semi-automatic and remote-controlled units.

(37) CORE DRILL—Detailed data and complete specifications on the Joy 22-HD heavy-duty diamond core drill are offered in Bulletin D-28 available from Joy Mfg. Co., Pittsburgh 22. The unit features a 2,000-ft capacity, is driven by gasoline, electricity or compressed air, and is mounted on truck, steel skids or underground column.

(38) HANDY BIT GAGE for use in reconditioning tungsten-carbide bits

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shows when to grind a dull bit and the proper angle to grind. Available from Rock Bit Sales & Service Co., Philadelphia 25.

(39) MOTOR STARTERS—Allis-Chalmers motor starters, Type H, for 2,300- to 5,000-v squirrel-cage, wound-rotor, synchronous and multi-speed motors, are described in a new 12-p Bulletin 14B6410A. The units are built for full voltage or reduced voltage, reversing or non-reversing, with plugging, dynamic-braking and multi-speed features. The Type 256 air-break contactor, particularly adaptable for applications requiring frequent starting, inching, reversing, plugging or dynamic braking, is described in detail in Bulletin 14B733. —Allis-Chalmers Mfg. Co., Milwaukee 2, Wis.

(40) MINING-MACHINE LUBRICANTS—New 16-p booklet from Standard Oil Co. (Indiana), Chicago 80, describes the six grades of the new improved line of Superia mine lubricants. Application on loaders, cutters, locomotives, mine cars and other mine equipment are discussed and illustrated.

(41) ELECTRIC MOTORS—Reliance pre-lubricated bearing design, said to provide more hours of motor operating life without relubrication, is discussed in detail in Bulletin B-2201 published by Reliance Electric & Engineering Co., Cleveland 10. Service Bulletin A-3025 contains up-to-the-minute information on the 83 Reliance authorized service shops located in 31 states throughout the country. The complete address, telephone number, and name of the man

in charge of each service shop are listed.

(42) PUMPING PROBLEMS created by pulps carrying sand and other abrasive solids and their answers are discussed in a new bulletin on the Wemco sand pump offered by Western Machinery Co., San Francisco 7. The bulletin describes and illustrates the mechanical features in detail and includes tables of pump capacities, pipe friction and pulp densities.

(43) CENTRALIZED LUBRICATION—New bulletin from Lincoln Engineering Co., St. Louis 20, Mo., offers details of the Lincoln Standardized lubricating systems for centralized uniform lubrication in a variety of applications. Features, operating advantages and possible applications are discussed and the bulletin also illustrates the systems, equipment and accessories available.

(44) TRACTOR ECONOMIES and efficiency for a variety of open-pit jobs are described and illustrated in Booklet A-307-NN issued by International Harvester Co., Chicago 1. In addition the company offers detailed operating, design and application data on its TD-18A diesel crawler tractor in a new 24-p bulletin, No. A-154-NN. The TD-18A has a rated drawbar horsepower of 87 and a 100 belt-hp.

(45) SYNCHRONOUS M-G SETS from 30 to 8,000 kw are illustrated and described in Booklet GEA-5506 now available from the General Electric Co., Schenectady 5, N. Y. The booklet shows four typical installations and describes the construction

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features of the synchronous motors and dc generators. Motor ratings include 60, 80, and 25 cycles, 0.8 pf, 220 to 13,200 v. Generators, both shunt- and compound-wound, are rated 125, 250 and 600 v.

(46) **POWER SHOVEL** — Marion Power Shovel Co., Marion, Ohio, offers Bulletin 401 outlining the design and operating features of the Marion Type 93-M Ward-Leonard electric machine. Built for heavy-duty service on long-term jobs, the unit incorporates Marion Ward-Leonard electric controls for all major operating motions, including hoisting, swinging, propelling and crowding.

(47) **AN ILLUSTRATED** pocket-size card giving tips on proper care and use of slings for safe handling is available to superintendents and safety directors for distribution to workers. Request Card 50-38 from the Macwhyte Co., Sling Dept., Kenosha, Wis.

(48) **TRACTOR SHOVEL** — The "Lodover," a new 1-yd combination overhead and front-end shovel for International Harvester tractors, is fully described in a new 8-p illustrated Catalog LO200 issued by Service Supply Corp., Philadelphia 32. According to the manufacturer, the Lodover substantially increases loading production because turns are eliminated, stepping up output as much as 60% on some jobs.

(49) **ALLOY CASTINGS**—Booklet issued by Stoddy Co., Whittier, Calif., covers a few of the numerous uses of hard-metal castings in various industries. The booklet shows the types of castings available, their size and price.

(50) **BEARING LUBRICANTS**—Bulletin available from Master Lubricants Co., Meadow and Jackson Sts., Philadelphia, covers the full line of Lubriko greases for anti-friction

bearings, with use and application data for 25 different Lubriko densities ranging from liquid greases to heavy cup lubricants. Suggestions on lubrication maintenance and lubricant selection also are included.

(51) **STEEL SHELVING**, lockers, cabinets, drawers and other steel shop and office equipment are illustrated, with prices, in new 16-p catalog issued by Precision Equipment Co., Chicago 41.

(52) **DIESEL TRUCK ENGINES**—16-p Bulletin 1506 from The Buda Co., Harvey, Ill., describes the new Buda DA Dyna-Swirl diesel engines especially designed for all types of heavy-duty trucks. Included are detailed specifications, including a full explanation of the Dyna-Swirl controlled-combustion system, said to improve the operation of the engine by providing approximately 15% more horsepower and 15% higher usable torque.

(53) **FILING SYSTEMS**—Creating the contents of an average five-drawer file costs over \$4,500 and operating this file one year costs approximately \$202, according to an extensive research study published as a service to management by Remington Rand, Inc., New York 10. Entitled "A Yardstick of Filing Cost and Efficiency," this handbook presents detailed costs for study and analysis of the creation and operation of files.

(54) **VIBRATION MOUNTING** — Featuring a step-by-step description of installation methods, a new catalog section published by The B. F. Goodrich Co., Akron, Ohio, describes application of Vibropad, a rubber pad, packaged with accessories, from which individual mountings to muffle the shock, noise and vibration may be fashioned for various types of machinery.

(55) **WATER CLARIFICATION** — Cochran Corp., Philadelphia 32, offers Bulletin 5001 describing construction and operation of the Cochran Liquon sludge-contact reactor, a water-conditioning apparatus that utilizes the chemical principle that previously formed precipitates added in the form of sludge or slurry will accelerate reactions.

(56) **LABORATORY EQUIPMENT** —Catalog 450, a new handbook issued by The Burrell Corp., Pittsburgh 19, as an up-to-date reference work on all kinds of laboratory apparatus and supplies, lists over 25,000 items and includes many improved methods and aids.

(57) **CLAMSHELL BUCKETS**—Bulletin H-350 offers design and operating data, capacities and dimensions for the Haisa line of clamshell buckets. Available from the George Haisa Mfg. Co., Inc., Div. of Pettibone Mulliken Corp., New York 51.

(58) **SYNCHRONOUS-MOTOR CONTROL**—A full description of Slipayn synchronous-motor control for the operation and protection of all types of synchronous motors is contained in Bulletin B-4379 available from Westinghouse Electric Corp., Pittsburgh 30. The bulletin describes the new Type ASR polarized slip-frequency field-application relay that can be adjusted on the job for the best operating conditions under load and a new pull-out relay that protects the motor in case it fails to synchronize.

(59) **WOUND-ROTOR MOTOR CONTROL**—New Folder 1487544 from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis., covers the construction and features of the A-C Type 257 liquid rheostat, said to provide stepless wide-range speed control of wound-rotor motors and to be especially desirable for variable-torque loads, as well as suitable for load-absorption and motor-starting applications.

(60) **MAGNETIC SEPARATORS**—Three new models of the Eries "Atomagnets," each available in a full range of sizes for use on wood and steel chutes, hoppers, tables, etc., are described in Folder B557, which may be had from the Eries Mfg. Co., Erie, Pa.

(61) **SAFETY EQUIPMENT**—New annual catalog published by the Parker Safety Equipment Co., Irvington 11, N. J., illustrates and describes the company's complete line of protective clothing, equipment and safety devices.

(62) **PIPED FIRE-PROTECTION SYSTEMS**—Bulletin F-5021 outlines the layout and application of Ansul dry-chemical piped systems to provide automatic or manually controlled fire protection for individual equipment units, stockrooms or complete plants. Available from Ansul Chemical Co., Marinette, Wis.

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Specially designed alternate attachments... quickly and easily interchangeable... greatly increase the Oliver Lull Loader's usefulness. Among them are Combination Coal and Snow Buckets, Concrete Buckets, Log Lifting Forks, Cranes and Backfiller Blades. In addition, a Tilting Lift Tower can be mounted on the Oliver Industrial Model "77" or "88" tractor.

You'll want more information on this cost-cutting, profit-building team. For all the facts, see your Oliver Industrial Distributor or write direct to:



OLIVER MODEL "77" with Log Lifting Fork attachment on Lull Shovel loader. Useful for handling pipe.



OLIVER MODEL "77" with Lull Shovel loader handling coal in specially designed coal bucket.



OLIVER MODEL "88" with Lull Tilting Tower Universal Loader with adjustable width lifting forks and material bucket. Hydraulic arms permit forward tilting of tower.

THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of industrial wheel and crawler tractors





Trouble-free service on the dirtiest jobs!

20 years' experience in engineering and manufacturing

Rugged construction for long service life

One indicator at the pump—no exposed moving parts

Trabon LUBRICATING SYSTEMS are Job Proved on Mining Equipment

Photo shows the Moss Tipple of the Clinchfield Coal Corporation, where Trabon is standard equipment. Production capacity has been boosted from 6,500 tons per day to 20,000 tons per day during the last four years. More than 1500 bearings are safeguarded by Trabon on this operation.

Write today for information on Trabon oil and grease systems for positive lubrication on coal crushers, washers, shakers, conveyors, and underground equipment.

Trabon

OIL AND GREASE SYSTEMS

TRABON ENGINEERING CORPORATION
1814 East 40th Street • Cleveland 3, Ohio



News Round-up

J. & L. Safety Savings Go to Mine Communities

"Safety Savings" of \$16,400 are being made available by Jones & Laughlin Steel Corp. to local welfare and hospital activities as a result of improved safety at its Vesta-Shannopin mines during 1949.

The payments, which represent savings in insurance and compensation costs during the year, are part of a company-wide program. In announcing the plan early in 1949, the company said: "Jones & Laughlin does not want to make money out of safety, nor do we want to profit from our safety campaign, except insofar as safety contributes to the health and contentment of our employees and their families."

Under the program, the Safety Savings are the amounts saved over the average of the 5-yr base period from 1944 to 1948, and their local distribution is recommended jointly by management and employee representatives. The Coal Division funds will provide the hospitals at Brownsville and Waynesburg with \$4,800 each for the purchase of equipment, as well as \$6,800 for an ambulance at Richeyville. J. & L. is thought to be "probably the first in industry to pass along, for community use, the money saved by improved safety performance."

EG&FA Helps Miners' Sons Seek Top Coal Posts

Vocational training that may lead to executive positions for the sons of miners working for Eastern Gas & Fuel Associates now is being offered in public schools near the company's 21 mines in Pennsylvania, West Virginia and Kentucky, according to L. C. Campbell, EG&FA vice president, who instituted the program.

School executives will be provided each month with booklets, reprints of magazine articles and motion-picture films that will show what the future holds for young men who prepare themselves through higher education for executive positions in coal mining. The program will be aimed at sons of present EG&FA employees.

"The need for trained minds in mining has become a serious problem," Mr. Campbell said in announcing the plan. "We need to attract the vision and skill that will keep our business

looking and moving ahead. The best men possible for those jobs are the sons of men who now mine coal. If just one student in each of the 106 schools attended by the sons of EG&FA mineworkers can be given the inspiration to prepare himself for a high position in the coal industry, our present efforts will be well worth while," he declared.

Anthracite Prices Up, More Boosts May Follow

An unscheduled boost in the price of anthracite, shoving the cost up 10 to 15¢ higher than the top price of last winter, was announced early in November by several producers. Reports that there might be additional increases later in the season remained unconfirmed.

The Glen Alden Coal Co. was the first of the old-line companies to announce the increase, upping prices 10¢ on egg, stove, buckwheat and chestnut and 5¢ on pea. Rice and barley remained unchanged. Other companies followed with increases of their own. The companies cited soaring production costs as their reason for price boosts.

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New Bituminous Group Lists Membership

Initial membership in the recently organized Bituminous Coal Operators' Association recently was disclosed when Harry M. Moses, BCOA president, filed with the UMWA the list of organizations it represents for col-



Danville Register & Her

What Happens When a Natural-Gas Pipe Line Explodes

REMINISCENT of an atomic-bomb explosion are these photos of a 30 acre farm area near Chatham, Va., where 550 ft of a natural-gas pipe line blew up Nov. 3. The blast, which was felt 10 mi away, tore up the earth, burned the ground brick hard and reduced trees to charred sticks. Many cattle were killed, but no humans were in the vicinity. The line was under test carrying natural gas from Texas to New York at the time, and cause of the explosion was unknown.



Consol Team Takes Home National Safety Trophy

CONGRATULATIONS ARE IN ORDER, as the first aid team from Mine 204, Consolidation Coal Co. (Ky.), poses with the trophy awarded for top honors in the first National Coal Mine First Aid Contest, held in Pittsburgh Oct. 21 [Coal Age, November p. 130]. Standing: M. E. Prunty (left), Consol safety director; William Stapleton, 204 superintendent; S. M. Cassidy, Consol president; L. C. Campbell, vice president, EG&A; Blaine H. Sexton, team captain; A. D. Sisk, chief, Kentucky Department of Mines and Minerals; C. E. Dutton; Raymond Wetzel; and Leroy Sexton. Kneeling: C. D. Halbert (left); W. W. Holsclaw; James Rutherford; J. M. Smith; and H. C. Blankenship. The top four teams in state competitions held in Kentucky, Ohio, Pennsylvania and West Virginia participated in the contest, which was sponsored by the chiefs of the mines departments in those states and by the safety division of the NCA.

lective bargaining and labor relations.

Six coal operator associations and 36 individual coal mining companies were listed, as follows:

Associations: Ohio Coal Association, Western Pennsylvania Coal Operators' Association, Northern West Virginia Coal Association, Central Pennsylvania Coal Producers' Association, Virginia Coal Operators' Association, Northern Panhandle of West Virginia Coal Operators' Association.

Not Members of Associations: Consumers Mining Co.; Wheeling Steel Corp.; Republic Steel Corp.; The Powhatan Mining Co.; The Red Parrot Coal Co.; C. H. Mead Coal Co.; The Buckeye Coal Co.; The Youngstown Mines Corp.; Ontario Mining Co.; Stonegate Coke & Coal Co.; Olga Coal Co.; Inland Steel Co.; Crucible Steel Co. of America; Jones & Laughlin Steel Corp.

Pittsburgh Consolidation Coal Co.; H. C. Frick Coke Co.; Bethlehem Collieries Corp.; Bethlehem Collieries Corp. (W. Va.); Monroe Coal Mining Co.; Carpenterstown Coal & Coke Co.; Armco Steel Corp.; Elk Mountain Coal Co.; Eastern Gas & Fuel Associates; Clinchfield Coal Corp.

The Davis Coal & Coke Co.; Lillybrook Coal Co.; Amigo Smokeless Coal Co.; E. C. Minter Coal Co.; Gulf Smokeless Coal Co.; Russell Fork Coal Co., Inc.; West Virginia Coal & Coke Corp.; National Steel Corp.;

Weirton Coal Co.; National Mines Corp.; Amherst Coal Co.; Logan County Coal Corp.

Overland Belt Will Slash Coal Costs, Promoter Says

The proposed overland belt conveyor between the Ohio River and Lake Erie will save coal's markets by cutting transportation costs, said Noel R. Michell, vice president, Akron, Canton & Youngstown R. R., in a recent address before the Lions Club, Cincinnati, Ohio.

Arguing that low-cost transportation of oil and natural gas through pipelines is cutting sharply into coal markets, Mr. Michell warned that only a revolution in the handling of bulk materials can stem the trend to competing fuels.

High freight rates on coal, now 51.7% above 1939, are partly the result of the inherent inefficiency of the railroads in handling bulk materials, he continued, while "the overland belt conveyor provides a modern, efficient and economical method of transporting bulk materials, such as coal, in vast volume."

Belt rates will be much lower than railroad rates now charged and may bring about a general lowering of railroad coal tariffs in the immediate area and in fields competitive with those served by the belt, he predicted.

MEETINGS

• Winding Gulf Operators' Association: annual meeting, Dec. 8, Black Knight Country Club, Beckley, W. Va.

• Coal Mining Institute of America: annual meeting, Dec. 14-15, William Penn Hotel, Pittsburgh, Pa.

NLRB Rules Against UMW, Court Cites Mine Workers

A National Labor Relations Board trial examiner has found UMW District 23 guilty of unfair labor practices and has recommended a court order directing the union to cease and desist its coercive tactics at operations of the Wathen Coal Co., in Kentucky. Also in Kentucky, the NLRB has invalidated a UMW contract with the Lathen Coal Co., Owensboro. Elsewhere, in Arkansas, the State Supreme Court has upheld the contempt conviction of 11 UMW members for violating an injunction against interfering with operations at the Ozark-Philpott mine, Utah Construction Co.

In the Kentucky case, S. L. Feiler, NLRB trial examiner, found the facts as follows: The company operated the Deanfield mine, non-union, and the Island mine, union. In October, 1949, about 200 men led by a UMW organizer stopped operations at the Deanfield mine through use of violence and threats. The company filed unfair-labor-practice charges. In March, 1950, when the industry-wide wage agreement was signed, the UMW refused to sign with respect to the Island mine unless the Deanfield mine also was included. The company gave in and withdrew its charges, and Deanfield operations continued without incident thereafter.

The UMW argued that since the company had sought to withdraw its charges, the existing contract should not be disturbed. The trial examiner ruled, however, that the unfair labor practices should not be disregarded and that recognition of the union must be withheld until it receives an NLRB certificate. He recommended that the union be required to cease coercion of the company and its employees, that it cease claiming to represent the employees until and unless certified by the NLRB, that it cease giving effect to the existing contract and that it refrain from renewing or extending the contract.

In the UMW-Lathen Coal Co. case, the NLRB sustained a company charge that coercion of non-union miners had forced signing of the contract, which contained a union-security clause making the UMW sole bargaining agent for the workers.

In the Arkansas case, which arose when UMW members attempted to stop operations at the non-union mine, criminal contempt proceedings were brought against a number of union men.

Over sharp rocks—through slush, gravel,
mud and deep ruts... **GENERAL** moves
more tons out and over the highways
EASIER! FASTER! SAFER! CHEAPER!



**THE
GENERAL
L.C.M.**

For most work off the road

GENERAL L. C. M.—thick, tough, deep lugs resist cuts, bruises. Tremendous self-cleaning tread develops extra traction forward or backward.



**THE
GENERAL
H.C.T.**

For most work on the road

GENERAL H. C. T.—tough, broad tread wears longer, has more traction. Free-rolling tread ribs steer easier, stop quicker on the highway.

GENERAL UNDERGROUND MINING TIRE—wide, deep-lug tread develops extra traction forward or backward. Reinforced side walls resist cuts, scrapes and bruises. Thick, diagonal tread bars steer easier, grip faster, give more hours of productive work.



**THE
GENERAL
TRUCK TIRE**

**SPECIFY
GENERAL TIRES ON
YOUR NEW EQUIPMENT**



GASIFICATION PROJECT under way at the Tiger mine of the Sinclair Coal Co., Hume, Mo., successfully taps a 24-in seam 30 ft underground to produce a high-Btu coke-oven gas and low-Btu producer gas from boreholes from the surface. At the right are: Dr. James Forrester (left), chairman, Department of Mining, Missouri School of Mines, director of the experiment; Dr. Erich Sarapu, Missouri School of Mines research fellow, field director; and T. C. Cheasley, assistant to the president, Sinclair Coal Co.

Unmined Coal Gasified by Electric Power

USABLE RESERVES of coal in the United States may be stretched greatly by electrocarbonization and gasification of unmined coal. That possibility was made clear Nov. 13 at the Tiger mine, Sinclair Coal Co., Hume, Mo., when 50 representatives of research agencies, engineering colleges, coal companies, chemical and affiliated industries, the U. S. Bureau of Mines and the industrial press saw a high-Btu coke-oven gas and a low-Btu producer gas vented from boreholes reaching down 30 ft through overburden to the coal seam below. The project, still in the small-scale experimental stage after 3 yr of investigation and experiment, is a joint undertaking shared by Sinclair Coal Co. and the University of Missouri School of Mines, Rolla, Mo.

The process now under study at Tiger mine takes place in two stages: carbonization by electrical resistance, followed by gasification of the remaining underground coke bed.

The coke-oven gas produced by electrocarbonization ranges between 550 and 600 Btu per cubic foot. The producer gas, made by forcing air under pressure through the incandescent coke, ranges from 150 to 250 Btu.

Coal in the 24-in seam now blocked off and being worked is carbonized by passing an electric current between electrodes buried in the coal. The present pattern is a straight-line arrangement of four electrodes at intervals of 30 ft, making a total distance of 90 ft. The electrodes, made of 5½-in stainless-steel tubing, are perforated to permit gas to pass inside the tubing and upward to the surface through 5½-in steel pipe.

The electrical current ranges from 2,300 v down across the entire 90 ft of the present installation. However, from one electrode to the next, a distance of 30 ft, 400 v seems to be ade-

quate for effective carbonization. The voltage must be decreased as carbonization proceeds, since resistance decreases as carbonization takes place.

Electrical conductivity of the coal is attributable mostly to moisture in the seam. Thus the path of the current between electrodes is not a fixed straight-line path but an unpredictable line of best conductivity. Generally, however, the coked area between two electrodes is in the shape of an ellipse.

Heated by its inherent resistance to electricity, the coal carbonizes. The volatile elements are driven off and passed up through the perforated electrodes and the boreholes. The gas becomes visible at the surface about 5 min after the current is turned on but peak output is not reached until an hour or so later.

Carbonization leaves a hot permeable coke bed, which can be ignited by passing air through it as much as two days after carbonization has been stopped. Air for igniting the coke is provided by a compressor at 210 cfm and 15 psi. Reacting with the hot coke, the air forms a producer gas which is forced up through the electrodes, now inactive, and the boreholes. Though neither oxygen nor steam has yet been used instead of air, either would boost the quality of the gas considerably.

In the present stage of development, about 4,000 cu ft of 600-Btu gas per ton of coal is produced by carbonization. Bigger volumes of high-Btu gas could be made by using higher voltage and amperage and higher temperatures. The remainder of the recoverable heating value inherent in the coal is converted to producer gas. With the compressor now in use, 3,600 lb of coal can be gasified in 24 hr.

Thus far, project directors point

out, only basic data are being gathered and the work still is experimental. The economics of the process has not been determined and must await further study by industries seeking opportunities for possible commercial development.

For the present, directors of the experiment report that they have not yet observed any roof falls that would block air circulation. They are confident that underground burning can be controlled as long as there are no cracks or leaks to the surface. Later, after the present block of coal is completely gasified, they will strip off the overburden to see exactly what has happened to the coal and the roof. For the future, they envision a distance up to 150 ft between electrodes.

"Very interesting," was the comment of James Elder, director of the underground gasification project now under way at Gorgas, Ala. Mr. Elder, who was present at the Tiger mine to see the demonstration, pointed out several differences between the Missouri and Alabama projects. The Gorgas experiment is conducted in a 42-in seam of coal under 150 to 200 ft of cover and the coal block being gasified is more extensive. Firing at the Alabama project is done by a thermite bomb rather than by an electric current and the distance between boreholes is considerably greater than that at the Tiger mine.

Dr. James D. Forrester, chairman, Department of Mining, Missouri School of Mines, Rolla, Mo., has general supervision over the project at the Tiger mine. Erich Sarapu, research fellow, Missouri School of Mines, is field director. T. C. Cheasley, assistant to the president, Sinclair Coal Co., has direct cognizance of the project in the interest of his company. Merle Guthrie is superintendent at Tiger Mine.

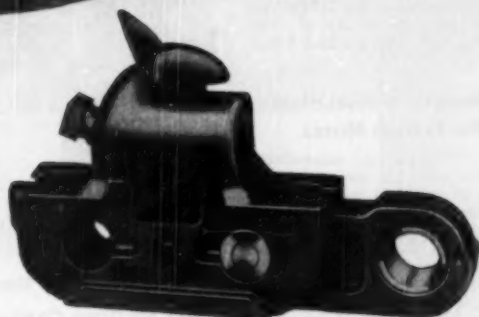
6 PROX

ON THE BANKS OF THE WABASH

CHAIN FEATURES

CLIPPING TO ONE TOP THESE ADVANTAGES... QUICK AND EASY MAINTENANCE

DEPENDABILITY
EXTRA LONG SERVICE
ADDED SAFETY



NOTE THESE IMPORTANT FEATURES

PROX TOOL STEEL BITS

A drop forged bit of fine alloy tool steel has been in service since 1938.

Noted for ruggedness and ability to stand abuse over any other manufactured bit.

This bit has been cutting coal for the largest coal companies for the past 10 years.

- Assures uniform bit gauge
- May be changed quickly
- Circular back edge is strongest possible design
- Each of these TOOL STEEL points cuts at least as much as a hard tipped ordinary mine bit

- Of strapless design—it is rigid and compact.
- No bulky heads that must be pulled through the cutting operation.
- Interlocks are machined—pins and bushings are hardened for longer cutting life.
- No chain whiplage as it comes off the drive sprocket.
- Sumps easier—cuts easier thereby eliminating the cloud of dust normally created in the cutting operation.
- Parts may be easily replaced in a few minutes on the job.

FRANK PROX COMPANY, INC.
VERDE HAUTE, INDIANA

PROX

ON THE BANKS OF THE WABASH — SINCE 1938

News in Brief

Eastern railroads reportedly are preparing to petition the ICC for authority to increase freight rates by 4%, with boosts on anthracite and bituminous coal of 12c a net or 13c a gross ton.

The first U. S. production of gasoline from coal in "practical quantities" was reported by the USBM Nov. 18. More than 250,000 gal had already been produced at the Bureau's demonstration plant at Louisiana, Mo., with daily output ranging up to 9,000 gal, it said. Some 30,000 gal of the gasoline, all produced by the hydrogenation process, is to be earmarked every month for testing in motor vehicles. Production by the Fischer-Tropsch process is scheduled to be begun at the Bureau's plant next spring.

Consolidated Edison of New York was reported Nov. 21 to be considering the use of powdered anthracite at its East River power plant, in an effort to cooperate with the United Nations by cutting down its smoke output. UN buildings are being completed adjacent to the plant.

Benjamin F. Fairless, president of U. S. Steel, indicated Nov. 16 that a "fifth-round wage increase for steel workers was to be expected and that it would be reflected in increased prices regardless of pressure from Washington. He maintained that the fifth round had already started and "so our men can't see why they should be discriminated against, and neither, frankly, can I." Mr. Fairless said that a 15c an hour increase, which he picked "out of the air" as an example, would necessitate a boost of \$6 a ton for his company's steel. Costs of 10 primary items used in steel making had increased so much this year that an additional \$4 a ton also would be necessary, or a total rise of \$10 a ton, he said.

In 1965, the United States will require 30% more primary energy—fuel and electricity—than it did in 1947, the USBM recently reported. The Bureau's exploratory study of the Nation's energy resources and requirements was released as guide for future planning and was based on past trends.

A new B. & O. exhibit designed to promote the use of bituminous coal both as an industrial and a domestic fuel was scheduled to begin a tour of the principal cities on the B. & O. lines with an initial showing for the road's directors in Baltimore Nov. 20. The exhibit will be open to the public and, in addition to stokers and furnaces for domestic heating, includes activated displays showing the operation of the most modern industrial furnaces and boilers.

Columbus, Ohio, was to be formally honored Nov. 16 by the Coal Producers' Committee for Smoke Abatement for having a smoke program that has "accomplished more without uneconomical restrictions than any other city." The ceremonies were to include presentation of a plaque to the city's mayor, James A. Rhodes, by Ed. H. Davis, president, New York Coal Sales Co.

Coal mine fatalities totalled 519 for the first 10 mo of 1950, for a rate of 1.15 per million tons, the USBM reports. For the first 10 mo of 1949, the rate was 1.20, with 472 men killed.

Huge Modernization Plan Asked for British Mines

A plan calling for the expenditure of \$1,778,000,000 over the next 15 yr to permit British coal mines to produce 40,000,000 tons more a year with 80,000 fewer miners was proposed Nov. 14 by the National Coal Board.

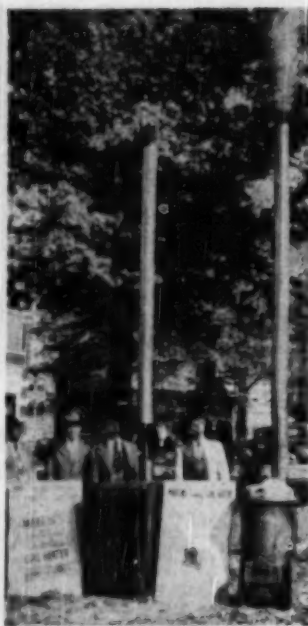
Under the program, which must be approved by the Ministry of Fuel and Power, over 250 existing collieries will be reconstructed to produce nearly 70% of the needed tonnage. A score of large new collieries and about 50 new drift mines will account for another 10% and the remainder will come from 250 existing collieries which will be unchanged. Some 350 to 400 present mines will be closed down, although 90 of them may be absorbed into other operations. Installation of new machinery and adoption of more efficient methods are a part of the plan also.

The Nation will require from 240 to 250 million tons by 1965, as compared with an output of 202,700,000 tons last year, the board said. Without the plan, output will fall to new lows by 1965 and mining costs might rise by one-fifth, it said. The reduction in manpower from the present 698,000 to 618,000 men in 1965 is no problem, it reported, since the difficulty lies in retarding the current reduction in manpower.

BCI Distributes New Bituminous Annual

Distribution of the 1950 *Bituminous Coal Annual* now is being made by Bituminous Coal Institute, Southern Bldg., Washington, D. C.

The new edition, third in the annual series begun in 1948, supplants previous editions. Statistical information published in the earlier volumes has been up-dated, new data have been added, the text has been rewritten and new photographs and graphic illustrations have been added.



Modern Equipment Shows . . .

You Can Burn Coal Without Having Smoke

Any bituminous coal can be burned without smoke if users have the right equipment. This fact recently was made clear to thousands of people, including city officials, in Knoxville and Kingsport, Tenn., when two coal-burning heaters—an old-fashioned burner and a newly developed smokeless burner—were fired up side by side in the public squares of the two cities. Both were charged with the same high-volatile coal. Out of the stack of the old-style burner came a cloud of smoke, as shown in the accompanying picture. The stack above the new-type burner stayed clear.

The smokeless heater used in the demonstration is the result of several years' work by BCR and leading coal-stove manufacturers. It is a magazine-type burner with automatic feed and large capacity. The demonstration was arranged as part of National Air Pollution and Smoke Abatement Week, October 22-28.

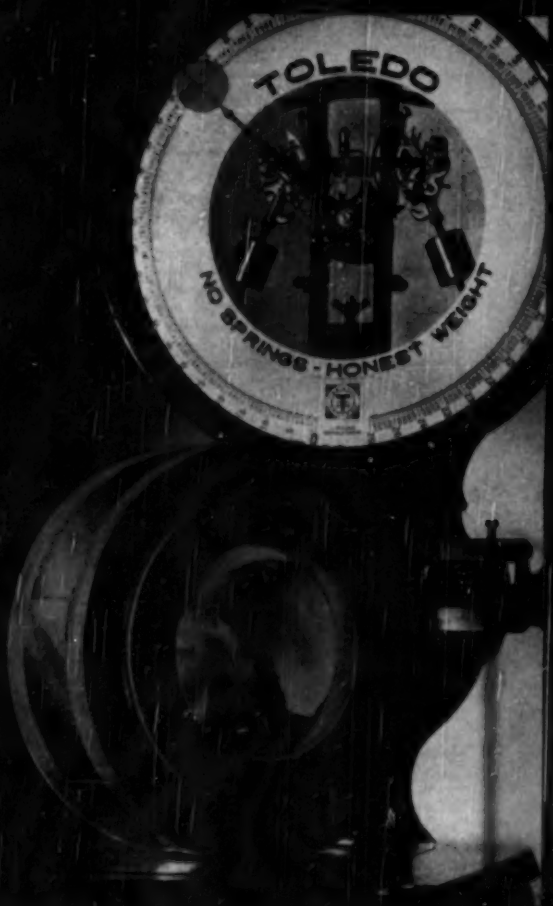
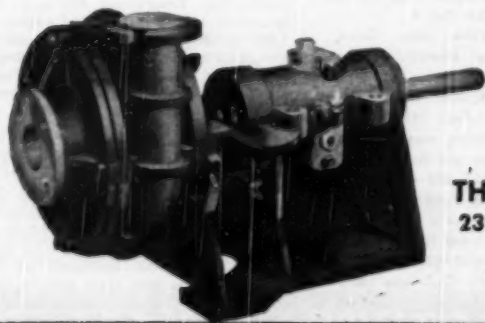
The index also has been enlarged and improved.

In announcing the new volume, Ralph Mulligan, public-relations director, BCI, said it is available to the business and industrial press, financial writers, educators and others with an interest in statistical information about coal and coal production, consumption, reserves, transportation, markets, research and earnings.

THE CHAMP WEIGHS IN ...after the fight

FOR two and a half years, the Hydroseal Sand Pump from which this impeller was taken gave continuous service with no appreciable loss in efficiency, capacity, or head... and when the impeller was removed for inspection, the engineers were surprised to find that it was only slightly worn. Day in and day out, the pump had delivered approximately 325 tons of minus 20-mesh silica sand per hour in a 1650 G.P.M. solution against a static head of 14 feet. Yet, after more than a million tons, it still had plenty of service left.

Records like this have made Hydroseals the world-champions in all classes of abrasive pumping from flyweight (AA-Frame) to heavy-weight (G-Frame). So don't forget... plant operators who demand the most from materials-handling pumps wisely choose Hydroseals.



This Maximix Rubber Impeller tips the scales at 89½ lbs., having lost only 2½ lbs. in pumping 1,100,331 tons of sand. The reason: absence of source off Maximix Rubber, allowing 4 to 6 times the useful life of equivalent metal parts.



HYDROSEALING

Clear sealing water keeps abrasives from leaking back thru the annular clearances between the rotating impeller and the stationary side plates. This reduces wear to a minimum and gives uniform efficiency throughout the life of the pump.

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MAXIMIX RUBBER PROTECTED

HYDROSEAL, PACKLESS AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING COUNTRIES OF THE WORLD

New Mine Developments

The Pittsburgh & Midway Coal Mining Co., Pittsburg, Kan., has started construction work on its new Mine No. 19, planned to replace its present Mines No. 15 and 18 which have been in operation in the West Mineral, Kan., area for the past 21 yr. The new plant will be located approximately 2 mi north and 1 mi west of Hallowell, Kan., and mine equipment is scheduled to be moved from No. 15 to the new stripping area late next summer. Much of the present cleaning plant now operating near West Mineral will be moved to the new location and the company plans certain modifications that will make the installation fully modern and efficient. Capacity of the new plant is expected to be somewhat smaller than the present one now operating. Unless weather prevents, the company plans to carry on a construction program throughout the winter and anticipates its completion by August, 1951.

Acquisition of the McDowell County, West Virginia, properties of the Southern Coal Corp. was announced by the Pond Creek Pocahontas Coal Co. recently. The property, which adjoins Pond Creek Pocahontas holdings at Bartley, W. Va., includes a mine that has been operating for a number of years, together with approximately 5,000 acres of coal lands with estimated recoverable reserves of 18 to 20 million tons recently acquired by lease. Pond Creek Pocahontas plans to continue operation of the present cleaning plant at a rate of 25,000 tons a month, while installing a new plant with a capacity of 50,000 tons monthly, which will be moved from one of its other properties. As operated by the Southern, the mine has been producing 20,000 tons monthly this year. Coal being mined is from the Bradshaw seam, averaging about 46 in thick.

Plans for the early opening of a new completely mechanized 2,000-tpd mine in Pike County, Kentucky, recently were announced by the Utilities Elkhorn Coal Co., Pikeville, Ky. Some 5,000,000 tons of No. 2 and 3 Elkhorn coal on Bear Fork of Robinson Creek has been leased by the company from the United Mineral Development Co. and development work is scheduled to begin immediately. Output will be trucked a few miles to Utilities Elkhorn's central cleaning plant at Esco, Ky., for shipment via the C. & O.

The Sinclair Coal Co., Kansas City, Mo., has purchased the Rogers County Coal Co., owners and operators of the Sequoyah mine near Claremore, Okla. Sinclair will continue the production and sale of "Sequoyah" coal from the operation, which is 6 mi northeast of Claremore on the Frisco R.R. Ted L. Kelce, a Sinclair vice president, has been named president

of the Rogers County Coal Co. and the company's main offices have been moved to Kansas City. The Sinclair organization also operate the Broken Arrow mine near Okmulgee, Okla., in addition to other strip mines in Missouri, Kentucky, Alabama, Illinois, Iowa and Kansas.

Official announcement was made early last month by the Colorado Fuel & Iron Corp. of plans for the development of a large new highly mechanized mine to be opened in the Stone-wall district west of Trinidad, Las Animas County, Colo. While the project had been reported under consideration for some time, official confirmation had been lacking until CF&I directors announced the new mine as part of a \$26,000,000 company expansion and improvement program. Construction of an extension of the Colorado & Wyoming Ry. from Segundo west to the property has already been started, it is reported, but the mine is not expected to be in operation until late next year.

The Philadelphia & Reading Coal & Iron Co. was scheduled to re-open the Buck Run colliery, near Minersville, Pa., Nov. 20. The Buck Run Colliery Co., which had operated the property since 1938 under lease from P&R, had closed down the mine a few days previously, idling some 350 men. John F. McCall has been appointed superintendent for P&R and output is trucked to its Oak Hill breaker.

Production from the McKay mine of the Northwestern Improvement

Co., near Ravensdale, Wash., has been resumed after a shutdown of almost 2 yr. The former underground operation, idled by high costs, has been replaced by stripping, with J. A. Terteling & Sons Co., Boise, Idaho, as the contractor. An estimated 250,000 tons of coal is immediately available, with another 1,000,000 tons in reserve, it is reported. Some 100,000 tons was stripped by Terteling for the Northwest Improvement Co. from the old No. 5 McKay mine.

Several truck-mine developments recently were reported in Eastern Kentucky. The Miniard Coal Co., Cornettsville, announced plans for the development of two operations on Leatherwood Creek near Cornettsville. The properties will have a total capacity of 1,500 tpd and will ship via the Leatherwood Branch of the L. & N. R. P. Price, Whitesburg, Ky., has recently acquired several loading ramps near Whitesburg in Letcher County and reportedly now ships 100 cars daily via the L. & N. His latest acquisition, the Adams & Skaggs ramp at Mayking, Ky., has been loading 800 tpd, which is expected to be increased shortly. The Bottomfork Coal Co., headed by M. K. Creech and others, is planning to open several truck mines near Mayking, with an output of 1,000 tpd.

Ralph Ruschell Coal Co., Avella, Pa., recently opened its new 1,000-tpd Ruschell strip mine in Washington County. The Pittsburgh seam is being mined and shipments are via the Pittsburgh & W. Va. R.R. Preparation facilities include a Chance cone, crusher, picking tables, vibrating and shaker screens.

Johnson Mining Co., St. Clairsville, Ohio, has changed its name to the Eastern Ohio Coal Co. No change in personnel or operation is involved.

The Kenilff Coal & Coke Co., Cincinnati, has acquired the Sunshine coke ovens near Masontown, Pa. The property includes 71 beehive coke ovens with an annual capacity of 40,000 tons.

The new \$1,000,000 Bryan strip mine of the North Western Coal & Metals Co. has begun production at Robb, 150 mi west of Edmonton, Alberta, Can. Employing 100 men, the mine will have an estimated output of 1,200 tpd and will "be the only major stripping mine in western Canada marketing hard domestic coal," according to Frank E. Ruben, of Montreal, president.

Plans for the expenditure of \$1,500,000 to rebuild the coal-preparation and briquetting plant and install modern equipment at the Nordegg, Alberta, mine of the Brazeau Collieries, Ltd., recently were reported by A. D. Sturrock, general manager. The company's plant was destroyed by fire last June. The new plant will be built of steel and will have a capacity of 1,600 tons daily, compared with the previous output of 1,400 tpd. Some 500 men will be employed.

EQUIPMENT APPROVALS

Six approvals of permissible equipment were issued by the U. S. Bureau of Mines in October, as follows:

Joy Mfg. Co.—Type WK-83T air compressor; one motor, 50 hp, 500 v, dc; Approval 2-750-A; Oct. 25.

Herold Mfg. Co.—Herold Bantam shaker drive; one motor, 5 hp, 230 v, dc; Approval 2-761; Oct. 9.

Homestead Valve Mfg. Co.—Homestead-Yeager all-electric steam cleaner; 250 and 500 v, dc; Approvals 2-762 and 2-762A; Oct. 13.

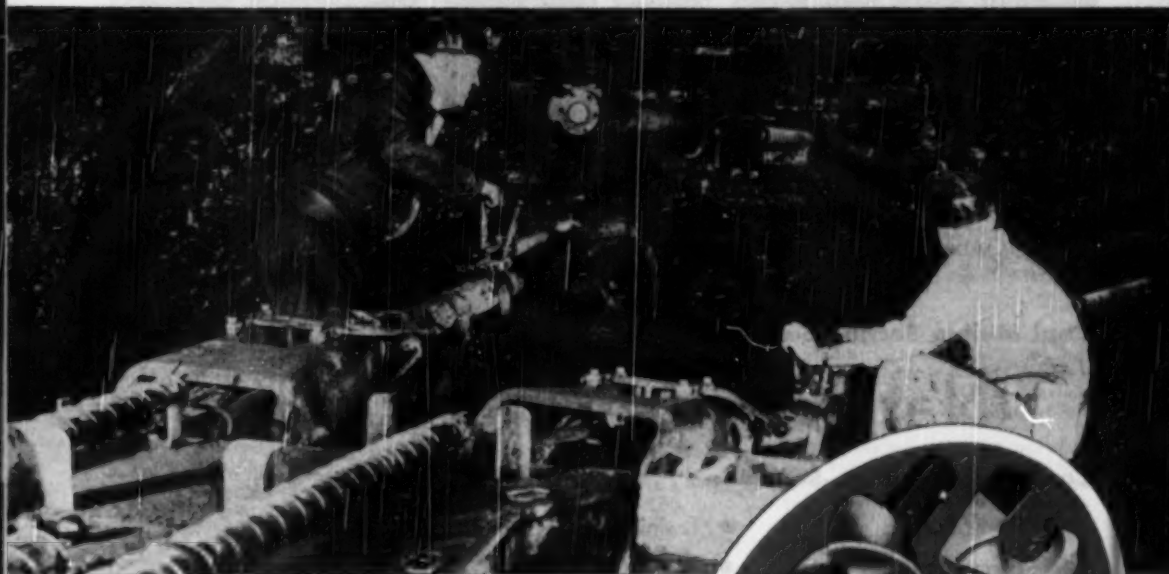
Joy Mfg. Co.—Type 148U-7C/D/G/H/HH/N loading machine; five motors, one 4 hp and four 7½ hp, 220, 440, 415 and 500 v, ac; Approvals 2-763 and 2-763A; Oct. 17.

Joy Mfg. Co.—Type U-179-4PE conveyor drive unit; one motor, 20 hp, 230 v, dc; Approval 2-764; Oct. 26.

General Electric Co.—Type L58E-2C6-K4 storage-battery locomotive; 10 tons, two motors, 96 v, dc; Approval 1541; Oct. 11.

JOY SULMET CARBIDE AUGER BITS

Save PLENTY in this mine!



JOY CD-26 Coal Drill, for trackless operations.

PLACE AND CONDITIONS: A mine in Southern Illinois. About 2' of sulphurous coal at the bottom of the seam—extremely hard to drill or cut. A bad top requires them to move in and out of a panel fast.

FORMER METHOD: Since their drill could only put in 16 holes in the bony per shift, they had to bottom cut and then drill the softer, upper part of the seam.

PRESENT METHOD: With Sulmet Auger Bits, they can put in 260 holes per shift in the bony with the same drill. Therefore, they can now cut above the hard band and shoot the bottom up.



Sulmet auger bits are available in 1 1/2", 2", 2 1/2", 3", 3 1/2", 4", 5", 6", 8", 10", 12", 14", 16", 18", 20", 22", 24", 26", 28", 30", 32", 34", 36", 38", 40", 42", 44", 46", 48", 50", 52", 54", 56", 58", 60", 62", 64", 66", 68", 70", 72", 74", 76", 78", 80", 82", 84", 86", 88", 90", 92", 94", 96", 98", 100".

RESULTS:

FORMER METHOD

Cutter chain life.....25,000 tons
Cutter bit cost.....\$.08 to \$.10/ton

PRESENT METHOD

Cutter chain life.....75,000 tons
Cutter bit cost.....\$.015 to \$.02/ton

This improvement is entirely due to the fact that Sulmet Bits permit high speed drilling in impurities without excessive auger bit cost.

*Consult a
Joy
Engineer*



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W & O L 3346

INDUSTRY MEETING—A Special Coal Age Staff-Written Report



ROOF BOLTING AND INJURY RECORDS—George A. Roos (standing), Philadelphia & Reading Coal & Iron Co., retiring chairman, Coal Mining Section; P. H. Price (seated left), West Virginia state geologist; H. F. Weaver, USBM; F. S. Leonard, Colorado Fuel & Iron Corp.; G. N. McLellan, Weirton Coal Co.; G. O. Tarleton, Consolidation Coal Co. (Ky.); A. T. Cross, W. Va. Geological Survey; and G. McCas, Consolidation Coal Co. (W. Va.)



SAFETY TRAINING—Karl T. Miller (left), safety engineer, The Hudson Coal Co.; M. D. Cooper, director, mining engineering education, NCA, and J. H. Forgie, safety engineer, Armco Steel Corp.

Coal Mining Section Surveys Progress in Mine Safety at . . .

National Safety Congress

Conference Themes—Safety in . . .

- Roof Bolting
- Electrification
- Ventilation
- Training and Education
- Machine Mining
- Drainage

ROOF-BOLTING experiences — good and bad—accident statistics and safety achievements, safety training in technical schools and on the job, and safety considerations affecting dust

control, ventilation, drainage, machine design, electricity, mine lighting and communications held the interest of over 200 safety-minded representatives of the coal industry in the Coal

Mining Section, 38th National Safety Congress and Exposition, Hotel Stevens, Chicago, Oct. 16-19. George A. Roos, vice president, operations, Philadelphia & Reading Coal & Iron Co., Pottsville, Pa., and general chairman of the Coal Mining Section for 1949-50, presided over the four sessions.

For 1950-51, Arthur Bradbury, safety engineer, Inland Steel Co., Wheelwright, Ky., was elected general chairman. Stanley H. Mooney, safety engineer, Woodward Iron Co., Woodward, Ala., and J. V. Berry,



SAFETY PROGRESS—C. E. Jones (left), safety director, District 29, UMWA; G. Berry, UMWA Local 9181; R. McCormick, Local 6048; H. R. Young, Local 6125; and R. Harris, Local 5770, all in District 29.



VENTILATION AND DRAINAGE—F. J. Peter-nell, Union Pacific Coal Co.; R. E. Doherty, Anthracite Institute; C. H. Maize, Pa. Mines Dept.



SAFETY IN SERVICES—W. D. Northover (left), Rochester & Pittsburgh Coal Co.; Evan Adams, Hanna Coal Co.; G. C. Barnes Jr., Virginia Polytechnic Institute; G. F. Pridemore, Lamp Department, General Electric Co.; and H. B. Buckingham, Tennessee Coal, Iron & Railroad Co.



NEW OFFICERS—H. J. Sloman (left), USBM, secretary; S. H. Mooney, Woodward Iron Co., vice chairman; Arthur Bradbury, Inland Steel Co., chairman; and G. G. Grieva, National Safety Council representative, Coal Mining Section, J. V. Barry, Bethlehem Collieries Corp., second vice chairman, was not present for the photo.

safety engineer, Bethlehem Collieries Co., Johnstown, Pa., were elected first and second vice chairman, respectively. H. J. Sloman, mining engineer, U. S. Bureau of Mines, Pittsburgh, Pa., was re-elected secretary. G. G. Grieva, National Safety Council, continues as the Council's staff representative to the Coal Mining Section.

The Monday afternoon session heard H. F. Weaver, assistant chief, coal mine inspection branch, USBM, Washington, D. C., compare injury records for mechanical-loading and hand-loading mines. Francis S. Leonard, chief mine inspector, Colorado Fuel & Iron Corp., Trinidad, Colo., led the discussion of Mr. Weaver's paper. Also, a panel discussion of roof-bolting experiences, good and bad, was presented, with participants as follows: G. O. Tarleton, vice president, operations, Consolidation Coal Co. (Ky.), Jenkins, Ky., moderator; A. T. Cross, geologist, West Virginia Geological Survey, Morgantown, W. Va.; George McCas, general superintendent, Consolidation Coal Co. (W. Va.), Fairmont, W. Va.; George N. McLellan, superintendent, Weirton Coal Co., Isabella, Pa.; Arthur Metcalfe, coal mine inspector, USBM, Fairmont, W. Va.; and Paul H. Price, state geologist, Morgantown, W. Va.

Safety in Loading—Emphasizing the limited nature of his data and declaring that conclusions are subject to revision as additional information is compiled in the future, Mr. Weaver observed that for the year 1948, the fatality rate in mechanical-loading mines was 13% above the fatality rate for hand-loading mines, the non-fatal accident rate was 6% greater in mechanical-loading mines than in hand-loading mines and the roof-fall injury rate was 11% higher in mechanical loading mines.

These frequency rates are based on man-hours of exposure as calculated from studies of 768 underground bituminous coal mines and their accident experience in 1948, Mr. Weaver said, adding that mechanical-loading mines, in this study, include those where coal is hand-loaded to conveyors.

The record might not be as good as it is, Mr. Weaver declared, were it not for the fact that most operators accompany a mechanizing program with an intensive safety effort.

Mechanization of a mine formerly operated on a hand-loading basis introduces many new hazards that can only be eliminated by effective training and education of supervisors and workers, Mr. Weaver concluded.

"I am quite in agreement with Mr. Weaver that definite information on the relation of accidents in hand-loading mines to those in mechanical-loading mines is meager, indeed," Mr. Leonard said, "and . . . it becomes apparent that, up to the present, mechanical loading is no safer than hand loading, considering the frequency and severity of accidents on the basis of man-hours of exposure."

In continuing his discussion of Mr. Weaver's paper, Mr. Leonard pointed out three factors that affect safe mechanical loading, as follows:

1. The physical features of the mine must be critically examined to be certain that bad roof or changes in seam thickness, for instance, will not endanger the larger crews that will ordinarily be concentrated in one working place.

2. Machines should be carefully chosen to fit existing conditions, and all possible safety precautions must be taken in design, maintenance and operation of this equipment.

3. Strict attention must be given to the selections of competent men as

supervisors. Both supervisors and workmen must realize that their jobs in a mechanized mine require a high degree of skill, thus it is mandatory that all training opportunities be seized.

"Until we can reach each individual with the message that it is his duty to be his own safety inspector, the best records now existing cannot be improved to any startling degree," Mr. Leonard declared.

Roof Bolting—In opening the panel discussion on roof-bolting experience, Mr. Tarleton stated that most accounts of bolting have been glowing stories of success, but, he cautioned, final results are affected by the unavoidable loosening of control when an experimental practice is placed in general use. However, Mr. Tarleton came out in favor of roof bolting by stating that present 1% rate of failure in roof bolts is better than the 3 to 5% of the total number of crossbars that kick out for various reasons.

Speaking of bolt functions, Mr. Price pointed out that the two major types of roof require different treatment. Unstratified, heavy roof rock must be secured to a strong upper formation by anchoring the bolt in the stronger formation, while thin strata must be bound together to form a single beam of sufficient strength to support its own weight. The latter condition makes it unnecessary to seek a formation capable of serving as an anchorage.

Closer geologic and petrographic study of strata overlying coal seams was advocated by Mr. Price, for the purpose of helping personnel predict roof action, thus permitting more effective roof control. Also, Mr. Price warned against setting bolts in straight rows, along or across open-

(Continued on p 165)

CLARKSON

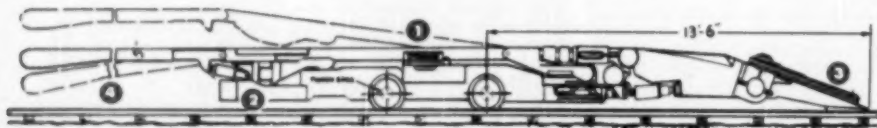
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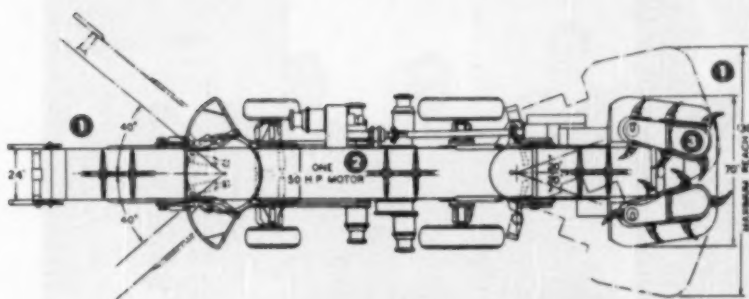
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- ② Only one 50 H. P. motor does the whole power job . . . no differential.
- ③ Front head raises and lowers 26" above and 18" below floor line. Complete flexibility for high or low coal. Loader has high road clearance.

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INDUSTRY MEETING—A Special Coal Age Staff-Written Report



PANEL ON STOKERS—J. S. Bennett (left), American Engineering Co.; E. L. Beckwith, Detroit Stoker Co.; Roger Gurfman, Electric Illuminating Co.; Harry Huston, Pettibone-Mulliken Corp.; and F. X. Gilg, Babcock & Wilcox Co.



GAS ANALYZERS—T. A. Marsh (left), Iron Fireman Mfg. Co.; C. H. Barnard, Bailey Meter Co.; and E. C. Payne, Pittsburgh Consolidation Coal Co.

Fuels Meet Scans Coal Technology

Varied Subjects Debated at 13th Annual ASME-AIME Joint Fuels Conference—Frothing, Dewatering, Sampling Methods and Stokers Investigated—Utility Men Place Reliance on Coal But Warn of Federal Control

WELL OVER 300 ENGINEERS, coal-company executives and coal-equipment manufacturers discussed their problems and debated coal technology at the 13th annual ASME-

AIME Joint Fuels Conference in Cleveland, Ohio, October 24-25. Major topics were gas analyzers, stokers, fine-coal flotation and dewatering, coal-sampling methods, coal's

abrasive qualities and coal's markets. At the banquet session Tuesday evening, Julian E. Tobey, president, Appalachian Coals, Inc., was given the annual Percy Nicholls Award for distinguished achievements in behalf of the coal industry.

Continuous, automatic gas analyzers now are making a beginning in the field of combustion control and will make further progress in the future, predicted C. H. Barnard, Bailey Meter Co., Cleveland, first speaker at the opening session.

Explaining that a catalytic-combustion-type oxygen analyzer, which



PERCY NICHOLLS AWARD for distinguished achievements in coal is presented to Julian E. Tobey (left), president, Appalachian Coals, Inc., by E. G. Bailey, Babcock & Wilcox Co.



COAL SAMPLING—A. L. Bailey (left), U.S. Bureau of Mines; W. W. Anderson and G. E. Keller, Commercial Testing & Engineering Co.; B. A. Landry, Battelle Memorial Institute; and Ralph Textor, The Textor Laboratories. Mr. Keller and Mr. Textor were co-chairmen.



PROGRAM FOR UTILITIES COAL BUYING—Carroll F. Hardy (left), Appalachian Coals, Inc., and William S. Major, Dravo Corp., co-chairmen; R. J. Brandon and Marshall Pease Jr., The Detroit Edison Co.



uses a standard fuel to burn out excess oxygen on a catalyst filament, is used for oxidizing atmospheres and that a similar analyzer, which employs air to burn unburned combustibles gas, is used for reducing atmospheres. Mr. Barnard cited present successful applications of continuous analysis and control in boilers, rotary kilns, refinery heaters and open-hearth furnaces.

The effect of coal characteristics on different types of burning equipment was the subject of a five-man panel that wound up the morning session. Participants were: J. S. Bennett, American Engineering Co., Philadelphia; Roger Curfman, Cleveland Electric Illuminating Co., Cleveland; Earl L. Beckwith, Detroit Stoker Co., Chicago; Harry Huston, Johnston-Jen-

nings Div., Pettibone-Mulliken Corp., Cleveland; and Frank X. Gilg, Babcock & Wilcox, New York.

Good underfeed-stoker operation depends upon adequate grate area, the temperature of air and the rate at which the plant is operating—full capacity or part load—Mr. Bennett pointed out. With some coals, high rates of burning increase the discharge of solid particles. Friable coals can be used up to 2 in in size; non-friable, up to 1½ in. With the right kind of equipment, even low-fusion ash coals can be burned successfully in underfeed stokers, he said.

Burning pulverized coal successfully depends upon several factors, Mr. Curfman stated. Sulfur corrodes steel bunkers and other working parts

of the handling and burning equipment. Excessive moisture clogs pulverizers, increases power needs and requires more hot air for drying the coal. Low grindability impedes pulverizer operation. In the furnace itself, high-ash content and low-fusion temperature create problems of ash removal and furnace maintenance. High moisture also is a deterrent to furnace efficiency.

Spreader stokers are least affected by coal characteristics, Mr. Beckwith declared. They burn all kinds and grades of bituminous and lignite with almost complete indifference to ash, volatile matter, sulfur and moisture. Though they do not burn anthracite, they do burn semianthracite and coke breeze provided design is right and percent of fines is high. As to coal size, spreaders will burn anything from 1½ in down, though they do not handle minus 10-mesh coal well unless larger sizes are mixed in. The best kind of fuel for spreaders is raw coal. Continuous-cleaning spreaders operate well at high rates of heat release but in hand-cleaned spreaders heat release must be kept low.

Chain-grate stokers are adaptable to a wide range of coals, Mr. Huston said. Ash is of minor importance as long as it is between 7 and 15%. Higher ash content causes high carbon loss, especially at high burning rates. Though recent design improvements make it possible to burn coking and caking coals, best operation results from free-burning coals. Ash-fusion temperature is of small importance on chain-grade stokers but size consist is all-important. Top size should range from 1¼ to ¾ in, depending upon the type of chain grate used and the kind of coal burned. Up to 40% of the feed may be fines if the fines are kept evenly distributed. Turbulence above the fuel bed is essential and moisture must be tempered in accordance with the burning characteristics of the particular coal being used.

In cyclone furnaces, temperature ranges above 3,000 F, Mr. Gilg explained. Thus, a molten slag is formed that traps the larger particles of coal and accelerates combustion. Up to 90% of the ash is tapped out as slag. High-ash, low-fusion-ash coals of the Midwest are most suitable for use in cyclone burners, though practically any coal can be burned, even coal containing up to 35% ash. Some ash is essential. Coals with high-volatile content burn best but medium-volatile coals can be handled satisfactorily. High moisture is no problem in the cyclone furnace provided the air is hot enough. Cyclone burning results in a minimum of fly ash and maximum combustion efficiency, Mr. Gilg concluded.

Air-pollution control must reconcile the sometimes conflicting interests of society, which demands health and cleanliness, and of industry, which

(Continued on p 186)



COAL TECHNOLOGY—Dr. Calvert C. Wright (left), Donald W. Gillmore and Dr. Shou-Chuan Sun, all of Pennsylvania State College, and H. F. Yancey, U. S. Bureau of Mines. J. W. Woomer, J. W. Woomer & Associates, and Howard A. Herder, Sahara Coal Co., served as co-chairmen.

Obituaries



Arthur C. Green

Arthur C. Green, 68, director and vice president in charge of sales, Goodman Mfg. Co., Chicago, died Oct. 31, following a heart attack. A graduate of the University of Michigan, Mr. Green was recognized in mining circles throughout the country as an authority on mining practices. He had devoted his entire business career to interests associated with the mining industries and was widely known for his work in the development of underground mechanical operation. Mr. Green joined Goodman in 1911 with a well-rounded experience in design, construction and production engineering and was assigned to sales work in the Midwest. He was appointed central district manager for the company in 1930, and in 1936 he was put in charge of western sales and made a director of the company. In 1937 he became general sales manager and was elected vice president and general sales manager in 1939. Mr. Green was a member of the AIME and the Lake Superior Mining Institute.

Elbert F. Strickler, 52, Landgraff, W. Va., general superintendent, Vera Pocahontas Coal Co. and its subsidiaries, the Jacob Fork Pocahontas Coal Co., and the Page Pocahontas Coal Co., died Oct. 23, following a heart attack while hunting on Lake Erie. Mr. Strickler attended the West Virginia School of Mines and later was employed by Consolidation Coal Co. From 1929 to 1936 he served as a superintendent for the New River & Pocahontas Consolidated Coal & Coke Co., joining Vera Pocahontas as superintendent in Page, W. Va., in 1936.

C. P. Anderson, president, Mary Francis Coal Co., died suddenly Nov. 8 at his home in Oak Hill, W. Va. A veteran of many years in the coal industry, Mr. Anderson was a member of the executive committee of the New River Coal Operators' Association at the time of his death.

Ernest H. Gilbert, 64, one of the pioneers in the development of the Scotts Run coal field, died Oct. 27 at his home in Morgantown, W. Va. A law graduate from West Virginia University, Mr. Gilbert in 1917 joined with R. M. Davis to develop properties in the Scotts Run field. In recent years Mr. Gilbert had operated a mine in Preston County.

Angelo P. Falsone, president, Throop Mining Co., died Oct. 27 in Pittston, Pa. A native of Italy, Mr. Falsone had lived in Pittston for many years and also was president of the Pittston Clothing Co.

Personal Notes

Harold A. Montag, assistant to the president, Joy Mfg. Co., last month was appointed a consultant in the defense program of the Department of the Interior by Secretary Oscar L. Chapman. On loan from Joy, Mr. Montag will advise Interior defense agencies on the equipment and supplies needed for assuring maximum output of mines throughout the Nation. A graduate of Ohio State University, with nearly 25 yr experience in mining, Mr. Montag was chief of the program section of the WPB Mining Division from 1943 to 1946, in charge of requirements and allocations for mining machinery and operating, maintenance and repair supplies. For the past 2 yr. he has been a consultant to the National Security Resources Board, a member of the technology committee of the National Minerals Advisory Council and a member of the task force of the National Bituminous Coal Advisory Council.

Joshua Smith, active in safety work for Eastern Gas & Fuel Associates since 1941, has been appointed safety director in charge of the accident-prevention department. C. R. Stahl, assistant to the vice president of the Coal Division, who has handled accident prevention and labor relations as one department, will continue to supervise labor relations. Mr. Smith first joined an EG&FA predecessor in 1929 as a rodman in the engineering department. Through successive promotions he became an assistant foreman in 1939 and was advanced to general safety inspector in 1941. In 1947, he became assistant to Mr. Stahl as head of the accident-prevention department.

Russell H. Wilmot, preparation plant and surface superintendent, Piney Fork mine, The Jefferson Coal Co., Piney Fork, Ohio, has been named superintendent of the Ceredo preparation plant of the Truax-Traer Coal Co., Ceredo, W. Va. Mr. Wilmot succeeds L. S. Edie, who has been made superintendent of a washing plant in southern Illinois.

John Williamson, formerly mine

manager, has been appointed superintendent, Mine No. 40, Peabody Coal Co.

B. C. Hylton, general superintendent, Lake Superior Coal Co., Superior, W. Va., has been appointed general superintendent of the company's affiliate, the Cannelton Coal & Coke Co., with headquarters in Bluefield, W. Va.

Darrell Gillespie, assistant mine foreman, has been appointed general mine foreman, Keen Mountain mine, Red Jacket Coal Corp., Red Jacket, W. Va. S. A. Cook, formerly section foreman, has succeeded Mr. Gillespie as assistant mine foreman.

John M. Rairigh has been appointed superintendent of maintenance for the Pennsylvania Coal & Coke Corp., Cresson, Pa.

J. H. Smith has been promoted to assistant chief electrician, Bennie Brown to shop foreman, and William Bench to section foreman, at the Keystone mine of Eastern Gas & Fuel Associates. R. H. James has been employed as section foreman. At Koperton mine, James G. Carr, foreman, recently retired after 29 yr of service with EG&FA Coal Division.

Miss Josephine Roche, who was named neutral trustee for the UMWA Welfare and Retirement Fund in the 1950 contract, recently resigned as president of the Rocky Mountain Fuel Co., Denver. Miss Roche, president of the company since 1928, resigned because of "the heavy and increasing pressure" of her work as trustee. Roy St. Lewis, of Washington, was named to succeed her as president of the company, with Anthony F. Zarlengo appointed to fill her vacancy on the board of directors. Mr. Zarlengo also was named counsel for the firm.

John S. Gates, formerly assistant secretary, has been elected secretary and assistant treasurer of the Lehigh Coal & Navigation Co. He succeeds Glen O. Kidd, who has resigned to become vice president in charge of sales for the Lehigh Navigation Coal Co., Inc., a wholly owned subsidiary.

William Neibich, master mechanic at the Zeigler No. 2 mine of the Bell & Zoller Coal & Mining Co., retired Sept. 29, his 65th birthday. Mr. Neibich first joined Bell & Zoller in August, 1908.

R. L. Blake, formerly superintendent of the central plant of the Consolidation Coal Co. (Ky.), Jenkins, Ky., has been named superintendent of maintenance for all mines of the company.

J. D. Clendenin, assistant professor, Division of Fuels Technology, Pennsylvania State College, has been named to head the preparation and utilization branch of the USBM Anthracite Laboratory, Schuylkill Haven,

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LOOK FOR THE YELLOW TRIANGLE ON THE REEL

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PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

Pa. In his new position, Mr. Clendenin will direct work designed to expand markets for anthracite, develop greater efficiency in its use and further more economical practices in the recovery, cleaning and sizing of coal.

Thomas Fraser, USBM mining engineer and specialist in coal beneficiation, left early last month for Bogota, Colombia, where he will serve as an adviser in the development of the country's coal reserves, under the new Point Four Program. During the past 8 yr Mr. Fraser has made nine trips abroad in assisting foreign countries with their coal problems.

Preparation Facilities

West Elkhorn Coal Co., Salisbury, Ky.—Contract closed with Deister Machine Co. for one Type 246 4x6-ft double-deck vibrating screen to prepare $\frac{3}{4}$ x $\frac{1}{4}$ and $\frac{1}{2}$ x0; feed capacity, 90 tph.

Sizemore Mining Co., McDowell, Ky.—Contract closed with Deister Machine Co. for one Type 1412 4x12-ft single-deck vibrating screen to prepare plus 5 in, 5x3, 3x2 and 2x0.

Valley View Coal Co., Pittston, Pa.—Contract closed with Western Machinery Co. for one No. 4C Wemco Mobil-Mill incorporating a 10x8-ft Wemco drum separator as the heavy-media separatory vessel, including the design and construction of the entire washing installation; unit to treat 170 tph of 2x3/16-in coal, using magnetite as the heavy medium.

N.S.W. Mining Co., Commonwealth and Newdell, Australia—Contracts closed with Western Machinery Co. to design and supply separate coal-preparation plants at these locations; each to include a No. 5C Wemco Mobil-Mill with a 14-ft-dia Wemco cone separator as the heavy-media separatory vessel; a prefabricated heavy-media feed-preparation plant consisting of washing screens and a 54-in-dia coal spiral; a water-reclamation system incorporating a 55-in-dia Wemco thickener; and a Wemco media-grinding plant for preparation of magnetite medium consisting of a 3-ft Wemco ball mill, 18-in Wemco SH classifier, demagnetizing coil, feeder, bin, etc.

At Commonwealth, coal feed will be 330 ltpd sized at 4x0, of which 275 ltpd sized at 4x3/16 will be cleaned in the Mobil-Mill, with float coal sized for marketing into 4x1 $\frac{1}{4}$ and 1 $\frac{1}{4}$ x3/16; the 55 ltpd of 3/16x0 not passing to the heavy-media circuit will go to the coal spiral for 48-mesh classification, with the 3/16-inx48-mesh coal rake product to be combined with fine washed coal from the heavy-media circuit; 48-meshx0 coal to be stored in a sludge dam for possible future treatment.

At Newdell, feed will be 350 to 380



Koepler Retires After 33 Yr in Pocahontas Field

W. E. E. Koepler, executive secretary, Pocahontas Operators Association, will retire Dec. 31, after 33 yr with the organization. He is the only executive secretary the association has had.

Since he took up his position in 1917, Mr. Koepler has directed his work along educational lines and has sought to build the policies of the association on a national basis. In this connection, he patented a map of the Pocahontas field according to boundaries set by the U. S. Supreme Court in trade-mark suits; helped plan and promote the annual Southern Appalachian Industrial Exhibit; originated the Pocahontas Exhibition Mine, which has had over 1,000,000 visitors since its opening in 1938; served 17 terms as first vice president, Smoke Prevention Association of America; published promotional and educational literature on Pocahontas coal; conducted coal conferences at state university centers throughout the Nation; developed the Pocahontas Electrical & Mechanical Institute and the Pocahontas Operator's Safety Committee; and invented equipment especially for burning Pocahontas coal.

In addition, Mr. Koepler has handled labor relations in the Pocahontas field for the past 9 yr without the help of a conciliation board or an umpire. About 30,000 miners are employed in this field.

After Dec. 15, Mr. Koepler will leave for his new home at Fort Lauderdale, Fla. His successor has not yet been named.

ltpd of 4x0, with either 250 ltpd of 4x $\frac{1}{4}$ or 275 ltpd of 4x3/16 passing to the Mobil-Mill for heavy-media treatment; cleaned float to be sized for marketing into 4x1 $\frac{1}{4}$ and/or 1 $\frac{1}{4}$ x3/16, 1 $\frac{1}{4}$ x $\frac{3}{4}$; approximately 100 ltpd of 3/16 or $\frac{1}{2}$ x0 from feed-preparation section to pass through coal spiral for 48-mesh classification, with the 3/16 or $\frac{1}{2}$ x48-mesh coal rake product

joining the fine-sized heavy-media-cleaned coal for marketing; the 48-meshx0 coal-spiral overflow to be stored in sludge dams for possible future treatment.

Hart & Hart Co., Webster mine, Providence, Ky.—Shipment by Deister Concentrator Co. of three SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning $\frac{3}{4}$ x0.

Linton-Summit Coal Co., Regent mine, Sullivan, Ind.—Shipment by Deister Concentrator Co. of one Model 108 Concenco revolving feed distributor for 6-way distribution.

Templeton Coal Co., Jonay mine, Sullivan, Ind.—Shipment by Deister Concentrator Co. of one Model 108 Concenco revolving feed distributor for 6-way distribution.

Stevens Coal Co., Trevorton, Pa.—Shipment by Deister Concentrator Co. of four SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning No. 5 buck.

Dakota Collieries Co., Zap, N. D.—Contract closed with McNally Pittsburgh Mfg. Corp. for 300-ltpd 3-track raw-coal preparation plant; r-o-m to be reduced to 6x0 through McNally Gearmatic breaker and screened at 3, 1 $\frac{1}{2}$ and $\frac{1}{2}$ in; box-car loading facilities on two tracks for 6x3 and 1 $\frac{1}{2}$ x $\frac{3}{4}$, with McNally Gearmatic crushing facilities for reduction of r-o-m to 1 $\frac{1}{2}$ x0 with rescreen facilities for production of 1 $\frac{1}{2}$ x $\frac{3}{4}$ and $\frac{3}{4}$ x0.

Colorado Fuel & Iron Corp., Allen Mine-West Portal, Weston, Colo.—Contract closed with McNally Pittsburgh Mfg. Corp. for complete raw-coal crushing-loading facilities for 250 tph; all r-o-m prescreened and reduced to 1 $\frac{1}{2}$ x0 via Pennsylvania Bradford breaker for ultimate loading on two tracks; separate rock-handling facilities provided.

Middle Fork Coal Co., Paintsville, Ky.—Contract closed with McNally Pittsburgh Mfg. Corp. for McNally-Norton unit washer addition for washing 75 tph of 1x $\frac{1}{4}$; precrushing equipment consisting of McNally-Pittsburg single- and double-roll crushers for reduction of plus 1 in to 1-in minus; with screening and conveying equipment by purchaser for removal of $\frac{1}{4}$ in from crushed 1x0.

Yates Coal Co., Coalton, Ky.—Contract closed with McNally Pittsburgh Mfg. Corp. for McNally-Norton unit washer addition for washing 5x3/16 at 70 tph; washed coal screened and dewatered over Ripl-Flo vibrator and Low-Head vibrating screen; crushing facilities via McNally-Pittsburg 36x48-stoker-coal crusher.

Jones & Heatherman Coal Co., Peach Creek, W. Va.—Contract closed with McNally Pittsburgh Mfg. Corp. for alterations and additions to present tippie and washer consisting of conveying equipment, vibrating screens, launder and steel structures.

WILMOT'S EMERGENCY SERVICE *Cuts "DOWN" TIME*

**Immediate Delivery of Replacement Parts, from Huge Stocks.
Casting, Machining, Sheet Metal Work Done on Short Notice.**

Wilmot specializes in filling rush orders for practically any breaker maintenance needs. Our unusual ability to help operators keep their plants in operation is solidly based on two phases of Wilmot service.

First, as manufacturers of a complete line of coal preparation and conveying equipment, Wilmot maintains large and widely varied stocks of parts — in some cases the largest in the country. Second, as illustrated here, our shops are specially equipped to furnish all types of casting, machining and sheet metal work required by the coal industry. In line with our emergency service policy, our shops are geared to fill rush orders for new or rebuilt parts.

As the originators of Rivetless chain, Wilmot stocks a complete line of parts for all sizes of conveyors and elevators, from sprockets to traction wheels.



Left, the largest available selection of rivetless chain and conveyor attachments.

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COAL CLEANING -- 120 pages;
full engineering data on preparation units.
CHAIN AND CONVEYORS -- 280
pages; for designers and maintainers.
CRUSHER ROLLS -- 44 pages;
another of Wilmot's popular handbooks.



Wilmot's modernly equipped foundry. We furnish precision castings of gray and ductile iron as well as steel, in desired metal specifications. Rush orders frequently completed in 2 days.



Main bay of Wilmot's machine shop; equipped for all sizes and types of work. Typical of its fast service, we recently met a customer's emergency by completing a shafting in 30 consecutive hours of machining.



Wilmot's plate shop. Here we fabricate replacement parts for, or actually rebuild all types of mining and breaker equipment. When in trouble Wilmot is your fast "friend in need".

WILMOT ENGINEERING CO.

HAZLETON, PA.
Plant
WHITE HAVEN, PA.

Among the Manufacturers

The Thew Shovel Co., Lorain, Ohio, has named M. B. Garber director of sales. J. T. Cushing has been appointed sales manager in charge of all domestic sales except those to the federal government. Robert Maynard continues as export manager. Q. J. Winsor relinquishes his present duties as assistant general manager and assumes a new position as manager of development sales, under the general manager.

Independent Pneumatic Tool Co., Aurora, Ill., has announced the organization of export corporations to operate as Thor sales and service branches in western Europe and South America. In western Europe, the new corporation, Thor Tool Continental, Inc., is located in Antwerp, Belgium, under the direction of Vance G. Turner, for the past 3 yr Thor western-Europe export representative. Thor Tool Hemisphere, Inc., is the new South America corporation, Sao Paulo, Brazil, with Donald E. Randall the newly appointed manager.

The re-election of F. M. Hawley as president and general manager and the appointment of six new officers have been announced by the Morse Chain Co., a division of Borg-Warner. J. N. Candler, formerly administrative assistant to Mr. Hawley, was appointed vice president and assistant general manager. R. J. Howison, formerly general sales manager, now is vice president in charge of sales. E. W. Deck, formerly manager of the Ithaca Plant, was named vice president in charge of manufacturing—Ithaca. M. V. Durkin, former manager of the company's Detroit plant, was made vice president in charge of manufacturing—Detroit. W. M. Reynolds was appointed secretary and treasurer and E. G. Wuensch was named assistant treasurer. V. P. Burgess was reappointed assistant secretary. Carlton R. Becker, formerly with the J. W. Minder Chain & Gear Co., has been appointed western factory representative for Morse.

John E. Ehler, formerly in the sales department of the Euclid Road Machinery Co., Cleveland, has been appointed manager of service and parts, succeeding J. M. Fairbanks, who has been promoted to the post of assistant factory manager.

Southwestern Engineering Co., Los Angeles, has appointed Lewis Walters as project engineer in the industrial division. Prior to his affiliation with SWECO, Mr. Walters had been associated with Phelps-Dodge, American Smelting & Refining, Bechtel-McCone, and most recently with the Ralph M. Parsons Co.

J. T. Farrell has been named assistant to the manager of sales of General Electric's Small and Medium Motor Div. and, in addition to specific assignments, will supervise the Marketing and Promotion Div. and a newly created Gear-Motor and Packaged-Drive Sales Div. Concurrently, Howard W. Bennett and Paul D. Ross have been appointed managers, respectively, of the new Gear-Motor and Packaged-Drive Sales Div., and another new group, the Erie (Pa.) D-C Armored Motor Sales Div. With the creation of the two new divisions, the former Gear-Motor and D-C Motor Sales divisions have been dissolved, it was announced.

The Buda Co., Harvey, Ill., has appointed E. R. Galvin merchandise manager. Ed Galvin has long been active in the industry, having served successively as general sales manager of Caterpillar Tractor Co., R. G. LeTourneau, Inc., and LaPlant-Choate Mfg. Co.

Changes designed to broaden the executive structure of Caterpillar Tractor Co., Peoria, Ill., announced by Louis B. Neumiller, president, include creation of an additional executive vice presidency together with promotion of several department heads. Personnel figuring in the announcement and their new posts include: Harmon S. Eberhard, formerly vice president, named executive vice president; William Blackie, vice

president, who will now coordinate with Peoria the administration of the Joliet and San Leandro plants and Caterpillar Tractor Co. Ltd., new British subsidiary; E. W. Jackson, director of parts and service, named a vice president; and Ralph M. Monk, director of industrial and labor relations, made a vice president.

Union Wire Rope Corp. has transferred D. E. Bedford to its eastern Pennsylvania and New York territory. For the past several years Mr. Bedford served as a representative in the Iowa and Nebraska territory.

A. R. Kelso has been elected vice president of Mack Trucks, Inc., in charge of manufacturing and production at all Mack plants. Mr. Kelso, who will make his headquarters at Allentown, Pa., joined Mack early this year as production counsellor.

J. W. Greene has been appointed to the newly created position of assistant manager of the valve and fitting department, Crane Co., Chicago. Mr. Greene formerly was sales manager of the company's New York branch.

Edward F. Doty, for many years associated with Quimby Pump Co. as a specialist in design and application engineering, has joined the Warren Steam Pump Co., Warren, Mass.

The Falk Corp., Milwaukee, has named George P. Maurer, a Falk employee for 24 yr, assistant chief engineer, gear technology. W. Stephen Richardson, made assistant chief engineer, applications and special products, has been with the company 13 yr. Edward J. Wellauer, newly appointed assistant chief engineer,

What's Happening to Coal and Business Activity

Coal Production				1950 to This Date	1950 Over 1949 to Date
Est. anthracite prod., week ending Nov. 11.....				787,000	38,838,000
Est. bituminous prod., week ending Nov. 11.....				11,900,000	432,902,000
Source: U. S. Bureau of Mines.					+3.6% +18.9%

Bituminous Coal Stocks (Thousands, net tons)				Consumption (Thousands, net tons)		
Oct. 1, 1950	Days Supply	Sept. 1, 1950	Oct. 1, 1950	Sept., 1950	Aug., 1950	Sept., 1949
Electric power utilities.....	24,940	100	22,925	24,142	7,456	7,782
By-product coke ovens.....	13,981	52	12,353	11,800	6,047	4,183
Beehive coke ovens.....					901	1,006
Steel and rolling mills.....	968	33	928	1,029	533	583
Cement mills.....	1,181	54	1,089	1,422	552	670
Other industrial.....	17,137	68	15,579	14,814	7,409	7,024
Railroads (Class 1).....	3,646	22	3,746	6,680	4,972	4,388
Retail dealers.....	2,457	11	2,344	2,074	6,758*	7,118*
Total.....	64,310	52	58,964	61,961	36,945	37,954
Source: U. S. Bureau of Mines. *Retail dealer deliveries.						36,567

Business Activity				Latest Week*	Month Ago	Year Ago
Business Week Index of Business Activity, wk. ending Nov. 11.....				221.7	223.0	166.5
Steel ingot operations (% of capacity).....				102.7	102.0	87.4
Electric power output (million kw-hr).....				6,574	6,509	5,435
Crude oil production (daily avg., 1,000 bbl).....				5,911	5,862	5,185
Misc. & L.C.L. carloadings (daily avg., 1,000 cars).....				84	82	67
All other carloadings (daily avg., 1,000 cars).....				60	60	79
Prices, spot commodity index (Moody's Dec. 31, 1931 = 100).....				467.6	464.1	344.0
Prices, industrial raw materials (B.L.S., Aug. 1939 = 100).....				336.8	317.0	229.2
Prices, domestic farm products (B.L.S., Aug. 1939 = 100).....				355.5	344.8	290.2
Prices, finished steel composite (Iron Age, 1934 = 100).....				2,837.6	2,837.6	3,766.6
90 stocks, price index (Standard & Poor's corp.).....				158.0	157.5	126.9

*Date of latest week for each series on request.

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conveyors...**

IT'S TIMKEN[®]...



Here's a Bartlett-Snow installation in which the conveyors have been carrying 100-ton loads every hour for four years on Timken bearing-equipped idlers.

**AND TIMKEN
AGAIN!**

HERE ARE SIX BIG REASONS WHY:

1 THOROUGHLY PROVED. Every heavy-duty conveyor in service 15 years or more using the popular dead shaft tapered roller bearing construction, is equipped with Timken[®] roller bearings.

2 EXTRA CAPACITY. Line contact between rollers and races gives Timken bearings extra load-carrying capacity, longer life. And Timken's tremendous automotive and industrial bearing production results in low unit costs, makes it economical to select bearings with capacity in excess of actual requirements.

3 FRICTION MINIMIZED. Precision manufactured, Timken bearings roll freely, frictionlessly because of their incredibly smooth surface finish and true rolling motion.



This Barber-Greene 5795-foot four-belt system moves limestone on 8,566 Timken bearings. Idlers turn freely, frictionlessly; belt wear is reduced.

AND TIMKEN...



This coal-carrying conveyor, built by Jeffrey Mfg. Co., has Timken tapered roller bearings in the idlers for long life, minimum maintenance.

4 LONGER IDLER AND BELT LIFE. The friction-free operation of Timken bearings means less sliding and scuffing between idlers and belts.

5 LONG-LIFE LUBRICATION. Not just lubricated for "life" (which could be very short) Timken bearings are lubricated periodically to eliminate gummy, sticky, jammed bearings and to insure long life.

6 MAINTENANCE REDUCED. Timken bearings insure long, trouble-free service, with a minimum of maintenance for the entire conveyor installation.

INSIST ON TIMKEN BEARINGS. And remember, the word "Timken" is not a bearing type but a trade-mark that applies to bearings made only by The Timken Roller Bearing Company. It will pay you to specify Timken bearings in heavy-duty conveyors. The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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TIMKEN
TRADE-MARK U.S. & CAN. PAT. OFF.
TAPERED ROLLER BEARINGS



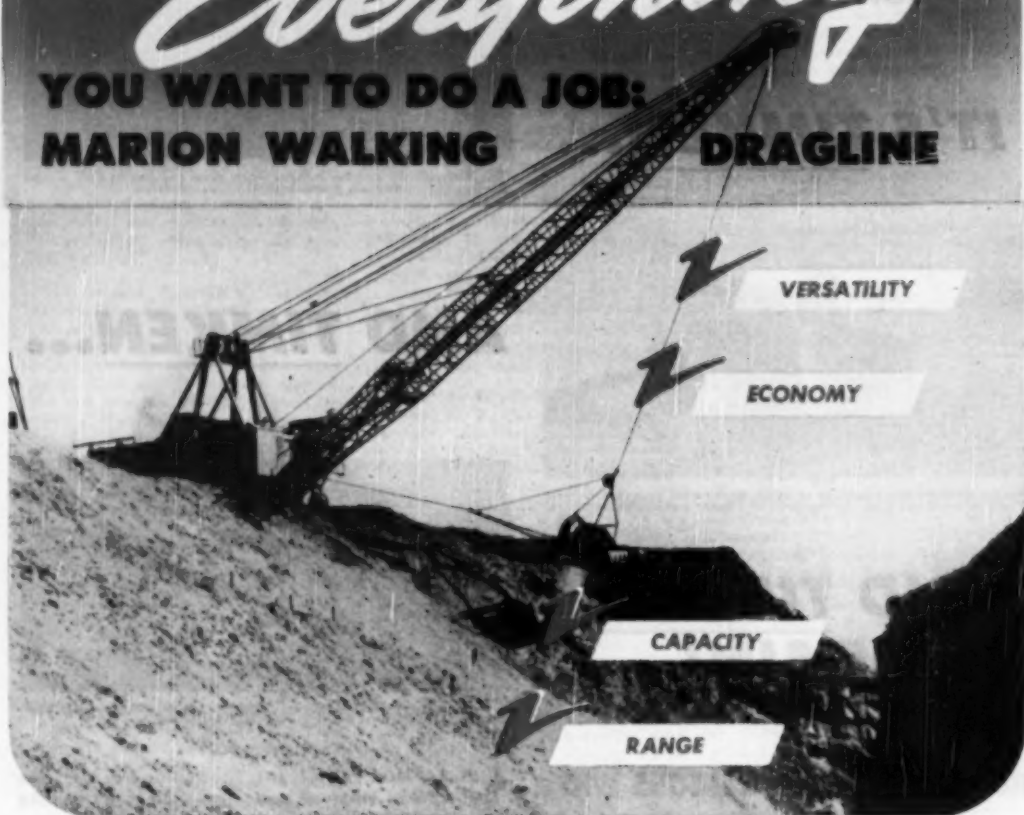
NOT JUST A BALL NOT JUST A ROLLER THE TIMKEN-TAPERED ROLLER BEARING TAKES RADIAL AND THRUST LOADS OR ANY COMBINATION

Everything

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MARION WALKING

DRAGLINE



VERSATILITY

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CAPACITY

RANGE

7 cu. yds. - The MARION 7200 Walking Dragline is steadily winning favor in coal throughout the world. Its size, range and ability to travel easily over rough and soft ground are a few of many reasons for its growing popularity.

13 cu. yds. - The MARION 7400 offers the same advantages in a larger machine for projects where the yardage to be moved requires additional bucket capacity. Either machine can be diesel or Ward-Leonard electric, depending on your preference. (For the biggest jobs, you may want to know also about the MARION 7800—a 30 cu. yd. walking dragline.) Get the full story on these machines from your nearest MARION sales office or write to us at Marion, Ohio.



materials and research, has been with the company for 17 yr.

A. Alven has been named general sales manager, Lipe-Rollway Corp., Syracuse, N. Y. Mr. Alven has been general sales manager of Rollway Bearing Co., Inc., Syracuse, a subsidiary of Lipe-Rollway, for the past 1½ yr and will continue in that capacity.

Dr. William P. Yant, director of research and development for Mine Safety Appliance Co., Pittsburgh, has been elected 1950-1951 president of the American Society of Safety Engineers, a national organization of 5,200 members affiliated with the National Safety Congress. With MSA since 1936, Dr. Yant formerly was supervising engineer of the USBM Pittsburgh Experiment Station. J. B. Davies, manager of the company's industrial department, has been elected 1951 president of the Veterans of Safety, an international organization of persons actively engaged full time in safety work for 15 yr or more.

Howard Cooper, manager of technical service of the Sinclair Refining Co., New York, has been elected president of the National Lubricating Grease Institute. Formerly vice president of the institute, Mr. Cooper has been with Sinclair since 1923.

L. B. McKnight, vice president, Chain Belt Co., Milwaukee, has been elected president of the Conveyor Equipment Manufacturers' Association, succeeding John M. Alvey, president, Alvey Conveyor Mfg. Co., St. Louis. Other officers elected were: G. W. Ostrand, general manager, Caldwell Plant, Link Belt Co., vice president; Earl D. Stearns, general manager, Conveyor Div., Barber-Greene Co., treasurer; and Lee Sekulski, sales manager, Mathews Conveyor Co., secretary. In addition, the following were elected to the association's executive committee: J. E. McBride, vice president, Palmer-Bee Co.; J. A. Jeffrey, vice president, Jeffrey Mfg. Co.; and Merrill E. Pratt, president, Continental Gin Co.

Flood City Brass & Electric Co., Johnstown, Pa., has acquired the pump and hoist business of the J. C. Stine Co., Tyrone, Pa. Parts required for Stine pumps and hoists now in service and replacement pumps desired by former customers may be secured from Flood City, the company reports.

Robert Taylor has been appointed to represent the Hewitt Rubber Div., Hewitt-Robins, Inc., in the western section of Kentucky. Mr. Taylor, whose headquarters are in Lexington, formerly was with the Acme Rubber Div. of the Acme-Hamilton Corp.

Johnson Plastic Corp., Chagrin Falls, Ohio, has purchased larger plant facilities which, with newly acquired manufacturing equipment, will permit the company to more than double its previous production capacity. Its former plant will continue to

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Koppers Pressure-Creosoted Lumber is fully protected against decay. *Retaining* its strength, it's safer to use, and in addition it shows profitable economy. Pressure-creosoted lagging is cheaper in the long run because it lasts three to four times as long as unprotected wood. Lagging can be cut to desired lengths before treating, eliminating costly cutting and fitting during installation.

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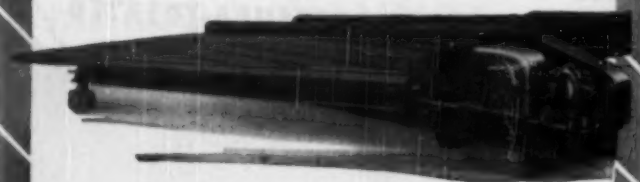
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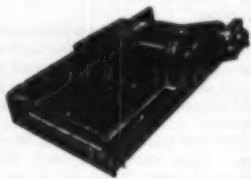
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When SuperDuties are installed in battery, your fine coal cleaning possesses great flexibility. While maintaining top washing efficiency you can "adjust" to any capacity requirements. Any single table or row of tables may be cut in or out to meet any production schedule, without affecting the efficiency of any cleaning unit or the overall plant. This means the utmost in operating economy.

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The Leashy Vibrating Screen possesses an uncanny ability to do a job right—and in record time. It screens wet or dry, using screen cloth or perforated plate. Excellent for fine mesh screening, de-watering or desanding. Range from finest mesh up to 2". Ask for Bulletin 14-H.



★ The ORIGINAL Deister Company ★ Inc. 1906

operate as a part of the company's over-all facilities in addition to the new plant, which offers 25,000 sq ft of space on 3 acres of land.

In a move to further diversify its manufacturing operations H. K. Porter Co., Inc., Pittsburgh, Pa., has acquired Connors Steel Co., Inc., Birmingham, Ala., producers of electric furnace steel and steel products with a plant capacity exceeding 94,000 tons yearly. B. C. Blake, formerly works manager, has been named vice president and general manager of Connors Steel, succeeding H. P. Bigler, who recently resigned for health reasons.

Coal-Company Earnings Rise as Third Quarter Ends

Earnings of coal companies reporting at the end of the third quarter, 1950, generally show improvements over the corresponding period in 1949. In some instances, dividends to stockholders also were increased.

Following are the reports of five companies:

Lehigh Coal & Navigation Co. and subsidiaries—Nine months, consolidated net income, \$1,846,656, equal to 96c per share, compared with \$1,334,844, or 69c per share in the same period, 1949.

West Kentucky Coal Co.—Nine months, net income \$2,705,744, or \$3.16 per share, compared with \$2,403,719, or \$2.80 per share in the same period, 1949. Third quarter, net income, \$827,943, or 97c per share, against \$696,611, or 81c per share, in the same period 1949.

Pittsburgh Consolidation Coal Co.—Third quarter consolidated profits, \$4,235,583, equal to \$1.76 per share, against \$2,053,511, or 95c per share, in the same period, 1949.

Pennsylvania Coal & Coke Corp. and wholly-owned subsidiaries—Third quarter, net income, \$4,433, against a loss of \$64,053 in the same period last year.

Island Creek Coal Co.—Nine months, net profit, \$3,566,793, or \$2.91 per share of common stock, compared with \$3,503,198, or \$2.85 per share, in the same period, 1949.

Dividends declared included the following:

Lehigh Coal & Navigation Co.—Dividend of 50c per share of common, bringing total of dividends declared this year to 80c, an increase of 30c over the amount paid in 1949. The latest dividend extends the company's unbroken dividend record to 70 yr.

Island Creek Coal Co.—Nine months, dividends totaling \$2.25 per share of common, identical with the figure for 1949.

Peabody Coal Co.—Third-quarter dividend of 31½c per share on convertible prior preferred shares, plus dividend of 10c per share for the second quarter on common stock, plus a special dividend of 10c per share on common.

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build an automobile
on a mountainside?**



no!

You'd build it in a factory where the necessary tools, materials and engineering assistance were available for low cost quantity production.

MOBIL-MILLS are likewise factory built. They are complete Heavy Media plants prefabricated for quick, low cost field assembly anywhere in the world.

- Installed in 7 days by Wemco's own engineers and crews, MOBIL-MILLS are complete in every detail—machinery, wiring, piping, stairways and walkways—all components required for immediate operation.
- Initial cost is low because MOBIL-MILLS are prefabricated plants, eliminating expensive on-site construction and extensive engineering supervision.
- Exceptionally clean coal is produced for which buyers pay premium prices. These Heavy Media plants handle even the toughest coal cleaning problems efficiently and economically—backed by 10,000,000 annual tons of MOBIL-MILL capacity already in operation.



MOBIL-MILLS are available in capacities from 25 to 420 tons per hour. Larger sizes are built to order.

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BRONZE
MACHINED
TO A
PERFECT
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Flood City Bronze Bearings and replacement parts are cast from a superior grade of hard, long-wearing bronze, and are machined by experts for perfect fit.

All standard bronze replacement parts for all types of mining equipment are carried in stock, and we are equipped to make any special bearings to fit your particular needs. Please write for estimates on your requirements.

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SPECIFY FLOOD CITY BRONZE
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Prompt deliveries can be made from complete stocks carried in both Johnstown and Charleston.

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BRASS & ELECTRIC CO.

JOHNSTOWN, PA.

BRANCH OFFICE, CHARLESTON, W. VA.

COAL MEN ON THE JOB



MINING IN BARBOUR COUNTY, WEST VIRGINIA—H. H. Boyles (left), pit foreman, Dick Construction Co. of West Virginia; W. G. Quillen, superintendent, Compass Coal Co.; M. W. Gottshall, superintendent, and W. L. Swartz, assistant superintendent, Dick Construction; and Stephen Canonico, general manager of both companies.



UNDERGROUND TEAM at the Wheelwright (Ky.) mines of the Inland Steel Co.—Seated: Roy Thomas (left), Roy Butcher and James Adkins, assistant foreman; J. T. Anglain, mine foreman; W. F. Hughes, general mine foreman; and Pat Adams, mine foreman. Standing: B. C. Ferguson (left), T. E. Sullivan, Frank Reed, Nathan Fleming and Alton Roy, assistant foremen.



IN THE SUPPLY HOUSE OFFICE, Bolair No. 1 mine, Pardee & Curtin Lumber Co., Bolair, W. Va.: B. H. Cutright (left), safety inspector; R. H. Dice, chief electrician for the company; H. B. Shockey, chief electrician, Bolair No. 1; G. E. McGuire and Jennings Brannon, supply clerks.

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Cummins[®] Diesels

More Cummins Diesels are being delivered in new heavy-duty highway trucks using engines of 150 h.p. and over than any other make of engine—**gasoline or Diesel!**

And more 200 h.p. model NH-600 Cummins Diesels are being delivered in new heavy-duty highway trucks than any other engine—**gasoline or Diesel!**

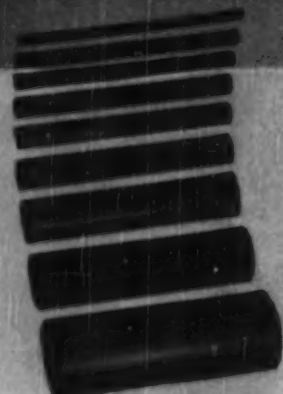
CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA
EXPORT: CUMMINS DIESEL EXPORT CORPORATION, COLUMBUS, INDIANA, U.S.A.—CABLE: CUMDIEX



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Lightweight High-speed Diesel Engines (50-550 hp) for:
On-highway trucks • off-highway trucks • buses • tractors
earthmovers • shovels • cranes • industrial locomotives
air compressors • logging yarders and loaders • drilling
rigs • centrifugal pumps • generator sets and power units
work boats and pleasure craft.

JOHNSONITE PLASTIC PIPE never corrodes



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Wyoming Pilot-Plant Studies Develop Efficient Method for Drying Fine Coal

FLUIDIZED DRYING of subbituminous fines by briefly entraining them in hot inert gas and then trapping them out as feed for briquetting presses is one of the investigations now underway at the Natural Resources Research Institute, University of Wyoming, Laramie, Wyo., to determine efficient methods that will permit profitable exploitation of large subbituminous reserves in Wyoming. The Institute, under the direction of Dr. H. G. Flak, is operating a pilot plant that includes drying equipment developed by V. F. Parry, supervising engineer, subbituminous and Rocky Mountain coals section, USBM, Denver, Colo., and encouraging results have been obtained. The coal studies at the Natural Resources Research Institute are under the supervision of Neal Rice and T. L. Johnston.

High moisture content with accompanying low heating value, poor weathering and storage characteristics, and low drying efficiencies obtainable with conventional equipment are major factors limiting the competitive radius of Rocky Mountain coals. Therefore, it is felt that more efficient drying will raise heating values by reducing moisture, and briquetting will improve storage and weathering characteristics, thus permitting Wyoming subbituminous coals to compete with premium fuels in distant markets.

Drying equipment in the pilot plant has a nominal capacity of 5,000 lb per hour of 1/4x0-in fines. Direct contact of the fines with hot inert gases (1,800 F) for less than 2 sec flashes into steam 70 to 80% of the internal moisture in the fines. The cooling ef-

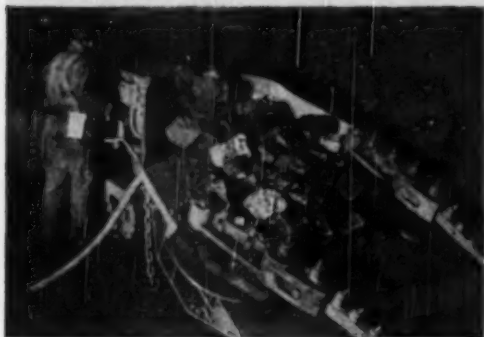
fected by the instantaneous evaporation of the moisture prevents any burning or devolatilization. The coal is removed from the hot gas stream by primary and secondary separators, with negligible weight losses. The dried coal is then briquetted, and research at the Institute is seeking efficient methods for producing high-quality briquets.

Natural Resources Research Institute Bulletin No. 3, November, 1949, by C. C. Boley and Neal Rice, recounts briquetting methods and results prior to installation of the new drying equipment. A subsequent report on pilot plant achievements with improved drying and the possibility of projecting them to commercial plants will appear in an early issue of *Coal Age*.

Association Activities

Operators' Association of Williamson Field, at its annual meeting in Williamson, W. Va., Oct. 27, elected officers as follows: president, Laurence E. Tierney Jr., president, Eastern Coal Corp.; vice president, Paul D. Ritter, president, Red Jacket Coal Corp.; treasurer, J. D. McLaughlin, president, Earleton Coal Co.; and secretary, Joseph J. Ardigo. Also elected directors of the association were: O. W. Evans, general superintendent, Norfolk & Western Fuel Dept.; Harry S. Gay, vice president, Gay Mining Co.; C. A. Hamill, president, Sycamore Coal Co.; Zack Justice, president, D.J.B. Collieries, Inc.; P. P.

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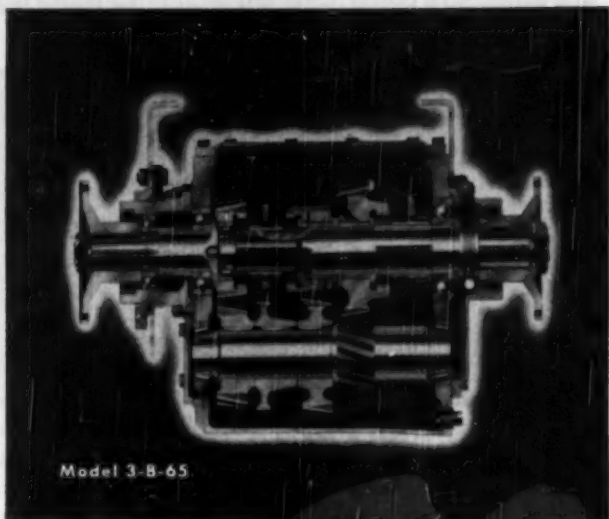
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Kerr, general manager, Kentland-Elkhorn Coal Co.; W. H. Leckie, general manager, Leckie Collieries Co.; D. H. Morton, president, Buchanan County Coal Corp.; F. P. Smith, president, Lando Coal Corp.; J. M. Tulley, president, Crystal Block Coal & Coke Co.; W. W. Walker, president, Majestic Collieries Co.; and J. E. Briggs Jr., president, H. E. Harmon Coal Corp.

Upper Buchanan Smokeless Coal Operators' Association also held its annual meeting in Williamson Oct. 27 and elected the following officers: president, C. A. Hamill, president, Sycamore Coal Corp.; vice president, J. W. Strickler, president, Page Pocahontas Coal Corp.; and secretary-treasurer, Joseph J. Ardigo. In addition, elected directors were: J. M. Tulley, president; Crystal Block Coal & Coke Corp.; and Paul D. Ritter, president, Red Jacket Coal Corp.

Northern West Virginia Coal Association, at its annual meeting held in Fairmont, W. Va., Oct. 24, re-elected all officers and directors. Officers of the organization are: George S. Brackett, president; T. E. Johnson, secretary-treasurer; J. F. Trotter, J. W. Bartlett and Thomas T. Rees, vice presidents.

Hazard Coal Operators' Association, at its annual meeting held in Lexington, Ky., Nov. 9, elected new officers, as follows: president, Lewis A. Hopper, vice president, Columbus Mining Co.; vice president, C. P. Gum, general manager, Wisconsin Coal Corp.; and secretary, William B. Sturgill, who recently joined the organization. Speakers appearing before the meeting included: J. E. Tobey, president, Appalachian Coals, Inc.; George S. Ward, secretary, Kentucky Mine Operators' Association; Joseph E. Moody, president, Southern Coal Producers' Association; John D. Battle, executive vice president, NCA; and John E. Tilford, president L. & N. R. R.

Harlan County Coal Operators' Association, at its annual meeting Nov. 15, elected the following officers: president, R. C. Scott, president, Cornett-Lewis Coal Co.; vice president, M. M. Ellison, general manager, Southern Harlan Coal Co. George S. Ward was re-elected secretary. Judge Charles I. Dawson presided as toastmaster at the banquet, which was attended by over 200 members and guests.

Retailers Get New Helps From Coal Heating Service

Text materials forming a part of the new Step-Up Sales Training Program for coal retailers now are ready for distribution by Coal Heating Service Division, National Coal Association. The program is based on the experience and advice of nine successful retail coal merchants in widely scattered sections of the Nation, CHS officials stated. These retailers spent two full days around a conference

at the working
face ...

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table contributing practical ideas from their experience.

The Step-Up Sales Training Program comprises a film, "Let Me Live," together with a guide for conducting meetings at which the film is shown; an eight-unit series of booklets outlining the customers' buying motives, ways of opening a sale, telling a sales story, showing and demonstrating, outselling competition, overcoming objections, closing the sale and planning for better results; and a series of discussion-provoking questionnaires.

Though designed primarily for use in a series of group meetings, much of the material is adaptable to the needs of individual retailers who cannot attend group meetings and therefore cannot take part in discussions or see the accompanying films.

The materials are available to all coal retailers, whether they are members of CHS or not. Study units may be obtained from CHS headquarters, Southern Bldg., Washington 5, D. C., at a cost of \$3 per set.

Foreign Developments



JOHANNESBURG—A public company to be known as the South Africa Coal, Oil & Gas Corp., has been registered with a nominal capital of £1,000,000. Basic products will be crude gasoline, diesel fuel and gas. All products will be made from coal. The government will underwrite up to £13,000,000 of the expected total costs, leaving some £7,000,000 to be raised by subscription. Using the gas-synthesis process to convert coal to oil, gasoline and gas, the company expects to produce some 35,000,000 gal of gasoline a year. Production will start up some 3 yr from now.

WELLINGTON—The New Zealand House of Representatives is considering a bill to restore unworked coal properties to private owners. The new bill would reverse the action of the late Labor government, which vested ownership of unworked coal in the Crown. Since expropriation in April, 1949, 228 former owners of unworked coal property have filed claims for \$4,334,400. The former Labor Minister of Finance charged that these former owners were basing their claims on undiscovered or unproved claims. The proposed law would not affect state coal mines formerly operated by private companies and now operated by the government.

BRISBANE—A bill to reduce the

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COAL CUTTING EQUIPMENT

royalty which Queensland coal leaseholders may collect has been introduced in the state parliament. The new maximum for royalties would be 5.6c per ton, against some 30c per ton charged by some absentee leaseholders. Passage of the bill would cheapen some Queensland coals by 19c per ton.

PARIS—International coal experts in France are undisturbed by rumors of an impending coal shortage in western Europe. The United Nations Economic Commission for Europe recently reported that coal consumption was up, stockpiles were down and production was below targets. Those who discount the UN commission's

prediction point out that the apparent shortage reflects a shift of stocks from pithead to industrial stockpiles and that end consumption of coal in western Europe has not increased more than 2% since Korea. They contend further that even if western Europe builds arms as fast as the most optimistic planners hope, use of coal still will not rise more than 7 to 8% in the next 18 mo.

Meanwhile, the French are sending a purchasing representative to the United States to seek additional supplies of coking coal. Steel production in western Europe is pinching coking-coal supplies, it is pointed out. This move by the French gives some substance to the rumor that the new

62 NEW PRODUCTS . . .

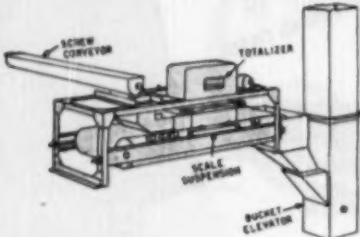
OR CATALOGS are described in this month's New Equipment section starting on p 114. Have you checked through them—or are you missing a good bet that may help you jack output and cut operating costs?

French coking process has developed "bugs." The French iron and steel industry will need 1,850,000 tons of coke per quarter, according to government officials. French ovens can provide 1,080,000 tons; the Saar, 270,000 tons; and Germany, Holland and Belgium together, 500,000 tons.

LONDON—A cabinet-level spokesman has intimated that unless British coal production can be increased greatly, foreign coal must be imported this coming winter. Britain usually counts on 16,000,000 tons of coal in stockpiles on Nov. 1. This year, stockpiles are down to 12,738,000 tons, according to the chairman, National Coal Board. Manpower in the mines is declining steadily at the rate of about 800 per week and, though mechanization is advancing, miners are uncooperative, it is reported.

ESSEN—Over 200 German manufacturers of coal-mining equipment and supplier showed their wares at this year's Coal Mining Exhibition, Sept. 13-24. This compares with only 87 in 1948. Four American firms and one Swedish firm took part. All the exhibits could be seen in operation.

VANCOUVER—The Western Coal Federation of Canada has been organized at Calgary, Alta., to publicize Alberta and British Columbia coal and to promote its use, especially in Ontario. W. C. Whitaker, commissioner, Western Canada Bituminous Coal Operators' Association, is secretary-treasurer of the new organization.



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COAL MEN ON THE JOB



SNAP CREEK COAL CO.—P. D. Garda (left), office manager, and E. J. Payne, vice president, in Mr. Payne's office at Snap Creek mine, Logan, W. Va.

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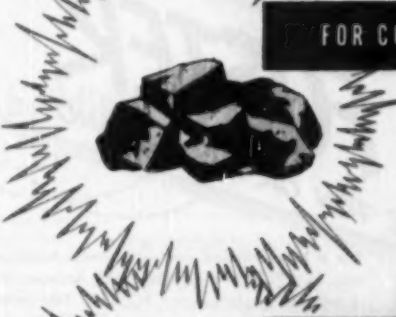
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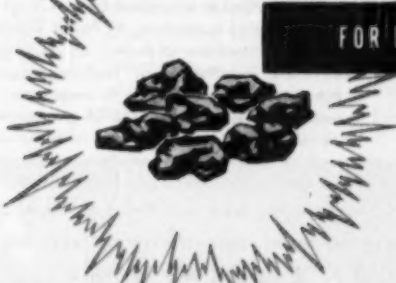
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FOR COARSE COAL

**RED H C
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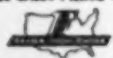


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The new Ontario market would replace markets in British Columbia and Alberta recently lost to oil and gas. However, a threat by railroads to cancel special low-cost freight rates may seriously affect shipment of British Columbia coals to the east. The rate now is \$8.40 per ton from western Canada to Ontario.

NOVA SCOTIA—Some 10,000 coal miners employed by subsidiaries of the Dominion Steel & Coal Corp. in Nova Scotia will receive Christmas bonuses of \$100 each, it was announced late in October, following 2-day wage talks between the company and union. Although the union earlier this year signed a 2-yr working agreement that ends Jan. 31, 1962, and provides for a basic wage of \$1.08 an hour, the conference was called after several locals protested the rising cost of living. In announcing the bonus, company and union officials said that in spite of the firm contract in existence, the "cost of living has risen so sharply in recent months that an effort should be made to increase the men's earnings." Men working from Jan. 1 to Dec. 21 will receive the bonus, payable Dec. 22. For those who have missed more than 20 days work, 50c per day lost will be deducted from the payment.

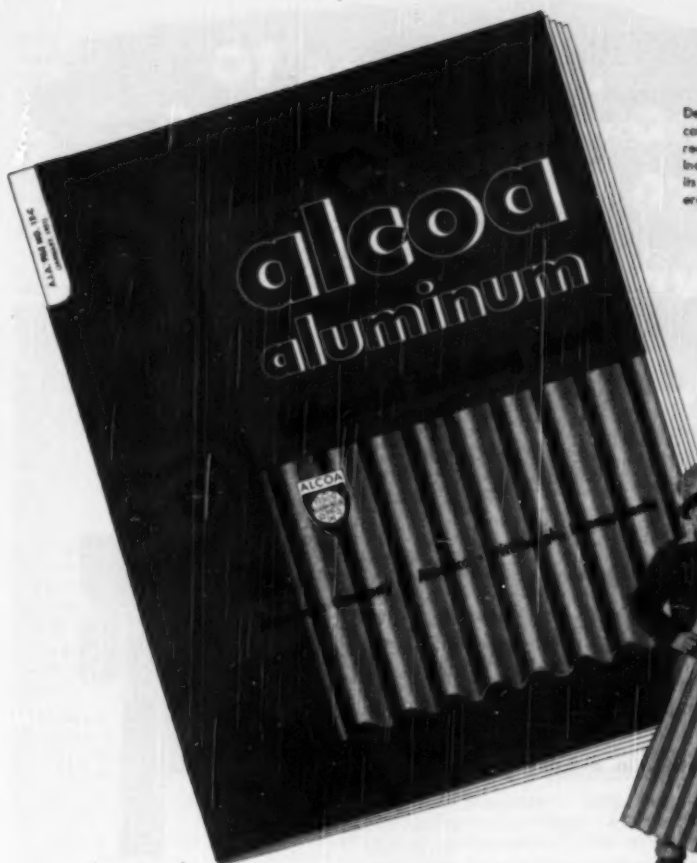
Coal Publications

Coal Preparation, edited by D. R. Mitchell, 2nd edition. American Institute of Mining & Metallurgical Engineers, 29 West 39th St., New York 18, N. Y. Price: AIME members, \$5.60; others, \$8; add 50c for overseas postage. Complete revision, with technology and data up-dated.

Management Strategy in Collective Bargaining Negotiations, by W. J. Baade, Jr., and Morris Stone. National Foremen's Institute, New London, Conn. 198 pp. \$5. Suggestions on writing peace-promoting contracts that also permit efficient business operations.

Psychology of Safety in Supervision, by J. L. Rosenstein. National Safety Council, 425 N. Michigan Ave., Chicago, 11, Ill. 6 booklets. 11 pp. each. 6x9-in.; paper. Price to members: 90c per set for 1 to 9 sets; non-members: \$1.80 per set for 1 to 9 sets; quantity prices on request. Titles: "You Can't Change Human Nature," "What Is Your U Q?" "Teaching Safety on the Job," "People Act Alike," "Safety Takes Teamwork" and "You Are Human Too." A leader's manual, telling how to organize and teach the program in the booklets, is in preparation.

Bibliography of Pressure Hydrogenation; I—Review and Compilation of the Literature on Pressure Hydrogenation of Liquids and Solids Carbonaceous Materials, by J. L.



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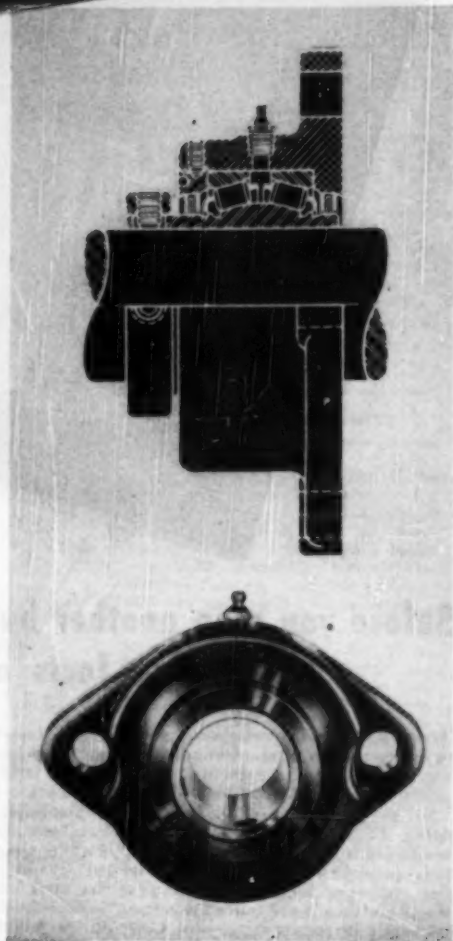
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Wiley and H. C. Anderson. U. S. Bureau of Mines, Bulletin 485. \$1.25, Supt. of Documents, Government Printing Office, Washington 25, D. C.

The Chemical Utilization of the Subbituminous Coals of Washington, by Lorents A. Conradi. Engineering Experiment Station, University of Washington, Seattle 5, Wash., Bulletin 6. 84 pp. 8½x11-in; paper. Free. Nature and extent of Washington coals; combustion; chemistry of coal extraction; gasification; low-temperature carbonization and hydrogenation of coal and tar.

Economic Aspects of Atomic Power: An Exploratory Study. Cowles Commission for Research in Economics. Princeton University Press, Princeton, N. J. 289 pp. 7x10-in; cloth. \$6. What may happen when atomic power is available for generating electricity and heating homes. Comparison by countries and by industries.

The following publications by the U. S. Bureau of Mines may be obtained free upon request to Publications Distribution Section, 4800 Forbes St., Pittsburgh 30, Pa. All publications are 8x10½-in; paper; mimeo.

Undecomposed Steam in Lignite Gasification, by M. H. Chetrick. R.I. 4738. 11 pp.

Estimate of Known Recoverable Reserves of Coking Coal in Cambria County, Pennsylvania, by J. J. Dowd, L. A. Turnbull, A. L. Toenges, H. M. Cooper, R. F. Abernathy, D. A. Reynolds and Thomas Fraser. R.I. 4734.

Physical Properties of Coke: Size and Its Measurement, by H. S. Auvil and J. B. Gayle, R.I. 4735. 27 pp.

NSC Coal Mining Section Surveys Safety Progress

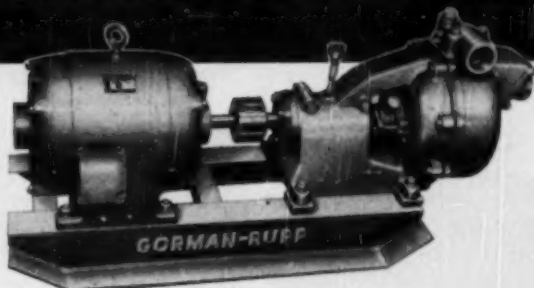
... Begins on p 136

ings, because of the possibility of developing planes of weakness in the roof.

Mr. McCaa confined his remarks to experience in the Pittsburgh seam, and declared that his experience with bolts has been good, to date. Roof bolting is more economical than hitching steel timbers into the ribs, which was the method formerly used to gain clearance for mechanical equipment. Still to be developed, however, are good dust-allaying equipment, better bolting machines and improved rock bits, Mr. McCaa concluded.

While present indications favor roof bolting for many benefits it offers, said Mr. McLellan, the practice is not sweeping Pennsylvania because it is still necessary to follow previous timbering methods, even where roof bolts are applied. Therefore, the full economies of roof bolting are not realized. Among the benefits of a good bolting

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Athens Armature & Machine Co., Athens, O.

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Cambridge Machine & Supply Co., Cambridge, O.

Central Mine Supply Co., Mt. Vernon, Ill.

General Machinery Co., Birmingham, Alabama

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Reliable Electric & Equipment Co., Zanesville, O.

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National Safety Congress

program, Mr. McLellan mentioned: (1) fewer roof falls, (2) better ventilation with less power, (3) reduced volume of supplies and less storage area, (4) more uniform rib lines and (5) less retimbering, thus permitting the supervisor to give more time to controlling face preparation.

Roof bolting should receive some of the credit for the reduction in roof-fall fatalities, said Mr. Metcalfe, in pointing out that 20 men have been saved from death under roof falls in the first 8 mo of 1960. Further study and development to improve bolting methods and equipment are necessary, with special attention to dust-control problems and a scientific method of determining the holding power of the bolts.

The strata in which a roof bolt is anchored to support weak immediate roof must receive careful study, Mr. Cross declared in telling of two failures that occurred when bolting crews thought they were anchoring in solid sandstone, but actually were anchoring in lenses underlying the sandstone. The lenses contained clay impurities, thus permitting anchorages to pull out cones of this weaker material and drop the roof. Geologic study of strata overlying coal seams was suggested by Mr. Cross, also.

In the beam-forming type of bolting, Mr. Cross stressed the necessity of getting the layers pinned together before any separation of strata could occur. At a mine visited by Mr. Cross, where fines produced was not a critical consideration, the bolts were inserted in a deep top cut and slanted toward the face to pin the exposed roof before the coal was shot. The practice was effective in controlling the otherwise troublesome roof. Mr. Cross concluded with the admonition that bolts of equal length might create a plane of weakness at anchor depth, and suggested that those using roof bolts be aware of this possibility.

Training for Safety—The Tuesday afternoon session was devoted to a discussion of training, education and organization for safety. Speakers were James H. Forgie, safety engineer, Armco Steel Corp., Montcoal, W. Va.; M. D. Cooper, director, mining engineering education, National Coal Association, Pittsburgh, Pa.; Prof. H. L. Walker, head, department of Mining and Metallurgical Engineering, University of Illinois, Urbana, Ill.; and K. T. Miller, safety engineer, The Hudson Coal Co., Scranton, Pa.

A panel discussion, "Progress of the Safety Program of District 29, UMWA," led by C. E. Jones, safety engineer, District 29, Beckley, W. Va., featured the following speakers: G. Berry, secretary, Safety Council 4, Local 9181, Rupert, W. Va.; R. Harris, secretary, Safety Council 2, Local 5770, Eccles, W. Va.; R. McCormick, president, Safety Council 1, Local 6048, Summerlee, W. Va.; and H. R. Young, chairman, safety committee,



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COAL MEN ON THE JOB



PLANNING NEW BELT—Lawrence Amicarella (left), mine foreman; John Sidle, superintendent; and R. W. Young, outside foreman, Lincoln mine of the Clayton Coal Co., Weld County, 20 mi north of Denver, Colo.

National Safety Congress

Safety Council 3, Local 6125, Capels, W. Va.

Basing his remarks on two verses from Proverbs, "Train up a child in the way he should go, and when he is old he will not depart from it," and, "Foolishness is bound in the heart of a child, but the rod of correction shall drive it far from him," Mr. Forgie pointed out that "we teach and correct if we are to properly accept and carry out our responsibilities as leaders and supervisors."

"Safety speeches have their place in the scheme of things," Mr. Forgie declared, "but of more importance, and certainly of more benefit, is the heart-to-heart talk that the supervisor has with the individual employee regarding his work, his company, his problems and his responsibilities in the industry in which he is employed and in which we hope he will become intensely interested."

Pointing out that the responsibility for training employees in safe on-the-job practices falls to the immediate supervisors of working crews, Mr. Forgie cited several examples of bad work habits that could result in serious injuries, or worse. The best possibility for eliminating these habits lies in the supervisor's opportunities to teach and correct on the job. Good supervision means dealing with men, not handling men, Mr. Forgie declared.

Take full advantage of available facilities and opportunities for safety training, Mr. Cooper urged, in outlining such efforts as high-school training in mining, college courses in mining engineering, Bureau of Mines facilities for first aid and mine rescue training and the aid of all mining agencies, since all are interested in mine safety.

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National Safety Congress

Dramatizing the difficulty encountered in driving the safety message home, Mr. Cooper commented on the large number of jaywalkers, with convention identification badges in full display, who crossed Michigan Ave. in front of the Stevens during the lunch period preceding the meeting then in session.

Mechanized mining offers a tremendous challenge to young men to apply their skills and knowledge in improving safety, and educational effort must be directed toward preparing young men for this mission, Mr. Cooper urged.

Among his recommendations were: (1) a safety course should be included in the mining-engineering curriculum, (2) classes of mining students, college and high school, should be welcome visitors at mine properties and at the plants of mining-equipment manufacturers, and (3) safety should be included in high-school mining courses.

In discussing Mr. Cooper's paper, Prof. Walker pointed out that a formal course in mine safety is not included in the mining-engineering curriculum at Urbana because such a course might be too descriptive, and perhaps not college-level. The safe method of doing things in preference to the hazardous method is stressed in other courses, such as design, ventilation and so on. Also, two courses in industrial safety are offered as electives by the industrial-engineering department at Urbana, and mining students may avail themselves of these.

Because of the limited time now allotted for earning a degree, the colleges must stress the fundamentals of operation, and students desiring to enter safety engineering would still require extensive training by their mining industry employers, regardless of the amount of training received in college, Prof. Walker said.

Pointing out that two of the last three explosions in Illinois coal mines were caused by smoking, even though a no-smoking law is in force, Prof. Walker argued that safety cannot be legislated and that the best opportunities for safety training occur on the job.

Commenting on Prof. Walker's discussion, Richard Maize, Secretary, Pennsylvania Department of Mines, declared that every mining-engineering student should take safety training for college credit because he should know how to set up a timber as well as a transit. Also, mining laws, without enforcement, cannot insure safety, but the law is the backbone of safety in mining, as on the highways.

In continuing the discussion, H. C. Woods, vice president, Sahara Coal Co., Chicago, Ill., declared that rules and regulations will not improve safety performance until the mine workers cooperate.

"We have complete cooperation,"

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National Safety Congress

declared Michael J. Kosik, president, District 1, UMW, "and we did it by talking it over—union officials and operators." Stating that the UMW is not trying to run anyone's mines, Mr. Kosik asserted also that some operators define cooperation as strict compliance with company rules, without the benefits of discussion. Pointing out that men do not go into the mines to be killed or injured, Mr. Kosik followed with a record of the benefits gained in District 1 by a co-operative approach to safety. Union safety meetings are being held, often with company safety representatives as speakers. It is understood that wages or other considerations should not be discussed at these safety meetings, Mr. Kosik said.

In reporting the results of accident-prevention classes among anthracite miners, Mr. Miller declared that it was not the intent of his company to replace supervision or inspection with such training, but that the program was adopted to help the union and operators fulfill the terms of the June 6, 1946, wage agreement.

It is difficult to provide full-time supervision for all men because of the great distances between working places and the difficulty of getting around in thin seams and on the steep pitches normally encountered. Therefore, it is advisable to train each man to recognize and correct hazards, thereby preventing many accidents, Mr. Miller stated.

Tracing the recent history of accident-prevention training, Mr. Miller reported that 6,700 men in the region have completed the course, which is prepared and conducted by personnel from the USBM office in Wilkes-Barre, Pa.

In the 18 mo up to June, 1950, the record told of 2.14 fatalities per million tons against 2.88 fatalities per million tons for the preceding 2½ yr. At collieries of The Hudson Coal Co., where classes had been conducted, serious accidents were reduced 11%, and minor accidents 6%, Mr. Miller reported. The base periods used to compute the comparison were June, 1947, to December, 1948, pre-training, and January, 1949, to July, 1950, post-training. The number of safety violations reported by federal inspectors also has been markedly reduced since the training was begun.

Some of the benefits of the training as pointed out by Mr. Miller are:

1. There is closer harmony between men and officials.
2. The training course gives vital information to both old and new employees in the shortest possible time.
3. The responsibility of each man for the safety of his fellow-workers is clearly defined.
4. Absenteeism does not disrupt the production schedule to the extent formerly experienced, because the replacement worker, through his training,

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$$= \begin{cases} 92.42\% \text{--} 1\frac{1}{4}" \times \frac{1}{4}" @ \$5.75 \text{ per ton} = \$5.31 \\ 7.58\% \text{--} \frac{1}{4}" \times 0 @ \$4.25 \text{ per ton} = 0.32 \\ \text{Total per ton} \quad \$5.63 \end{cases}$$

increased gross realization = \$0.63 per ton

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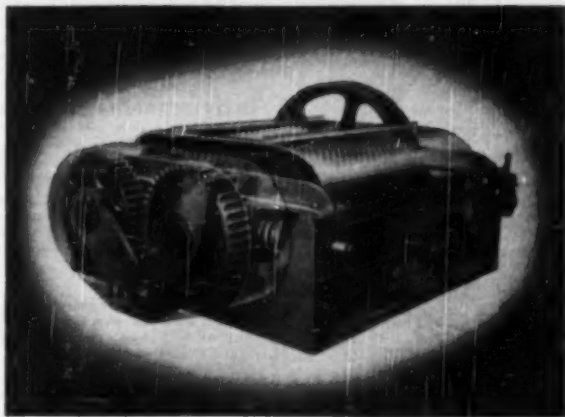
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COAL MEN ON THE JOB



MERRILL COAL CO.—H. H. Vance (left), tipple foreman, and H. C. Hilton, office manager, Big Creek mine, Logan County, W. Va.

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National Safety Congress

ing, is more aware of the hazards of the unfamiliar job.

Previous attempts to conduct training classes failed, Mr. Miller said, because the worker was not stimulated. Now, however, all agencies are promoting the classes and the excellent material being taught has resulted in 100% enrollment and completion at some collieries.

In opening the panel discussion on the progress of the safety program in District 29, Mr. Jones paid tribute to the cooperative spirit prevailing among employers, employees, and state and federal agencies. Mr. Jones then introduced the four panel speakers, who gave an account of some of the safety achievements in District 29.

Outlining safety organization in District 29 from its inception in January, 1946, until now, Mr. Young described the functioning of safety councils in each of the four fields of the district, the methods of operation of safety committeemen in each field and the training effort among the mine workers.

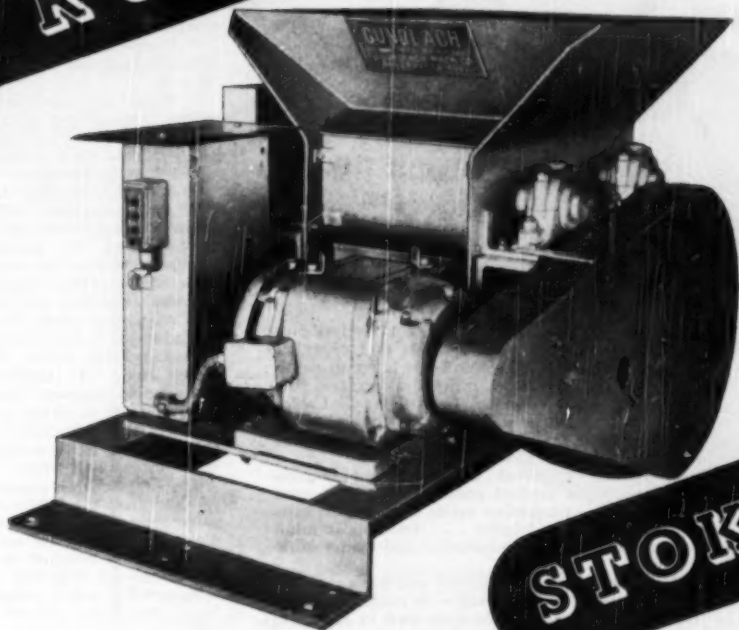
The safety committeemen accompany the federal inspector on his mine visits, confer with the inspector and management after the inspection to discuss the elimination of hazards found by the inspector, and promote first-aid training and contests. Also, the safety committee investigates fatal accidents and reports the results of that investigation to local and district officials; further, they inspect their mine once each month from December through April.

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National Safety Congress

papers by certified men, Mr. Berry quoted statistics as follows:

Year	Lost-Time Injuries	Fatal Injuries
1945	6,280	117
1946	6,022	99
1947	5,648	98
1948	5,327	77
1949	3,205	37

Since 1945, lost-time injuries have been reduced 40% and fatal injuries, 69%. Compensation charges per \$100 of payroll were \$2.85 in 1945 and \$1.78 in 1949, Mr. Berry added.

A 64% reduction in federal mine-code violations, a 48% reduction in lost-time injuries and a 17% reduction in compensation premiums were safety achievements at Summerlee mine, New River Co., Mt. Hope, W. Va., from 1945 to 1949, Mr. McCormick reported. These reductions were made possible by improvements in operating practice, as follows:

1. Excessive haulage speeds are prohibited.
2. Frequent tests for methane and constant checks on the roof now are the rule.
3. Places are narrowed to safe widths.
4. Rock dusting and water sprays help eliminate the dust hazard.

"We have had excellent cooperation from mine management at Summerlee," Mr. McCormick declared, "and cooperation from state and federal inspectors, also. Our accomplishments were brought about by work and vigilance of the safety committee, management, employees and inspectors."

In describing safety improvements at Eccles No. 5 mine, Eastern Gas & Fuel Associates, Eccles, W. Va., Mr. Harris said, "The safety committee and mine management have had their disagreements at times, but the accident record is conclusive proof that there has been pretty good cooperation between the two groups."

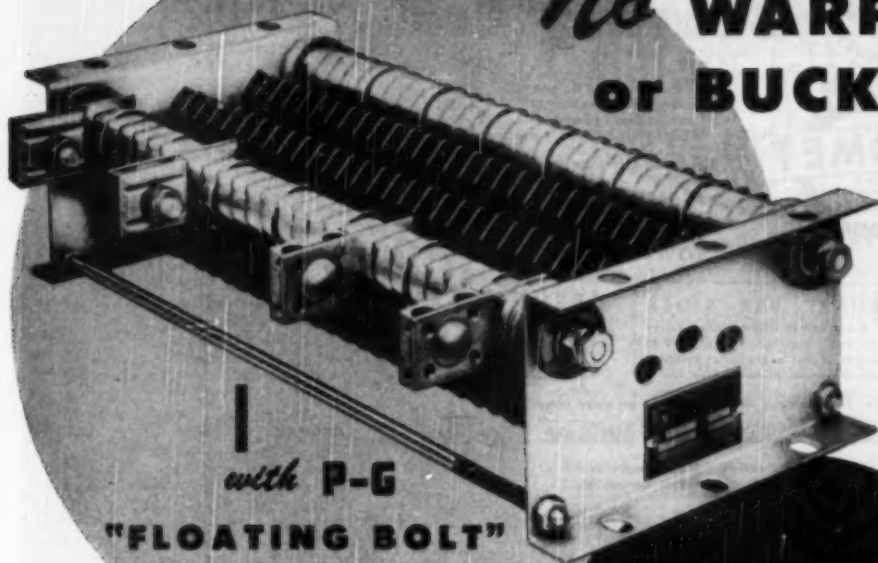
The first federal inspection report received after the federal mine-safety code became effective contained 56 violations, Mr. Harris said, and the latest report, received in 1950, contained only 11 violations.

As proof of safety strides at Eccles No. 5, Mr. Harris offered the following:

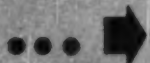
Year	Lost-Time Injuries	Fatal Injuries
1945	103	4
1946	103	2
1947	63	3
1948	52	0
1949	34	2

Dust, Air, and Water—On Wednesday afternoon, Dr. A. J. Vorwald, director, The Trudenu Foundation, Saranac Lake, N. Y., spoke on the diagnosis, control and prevention of pulmonary diseases related to mining. C. W. Owings, mining engineer, USBM, College Park, Md., led a dis-

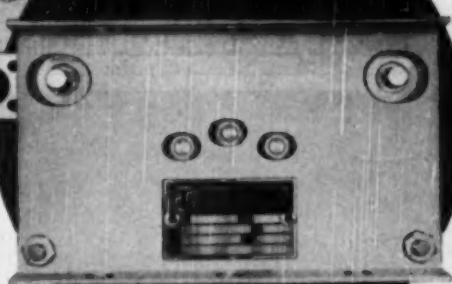
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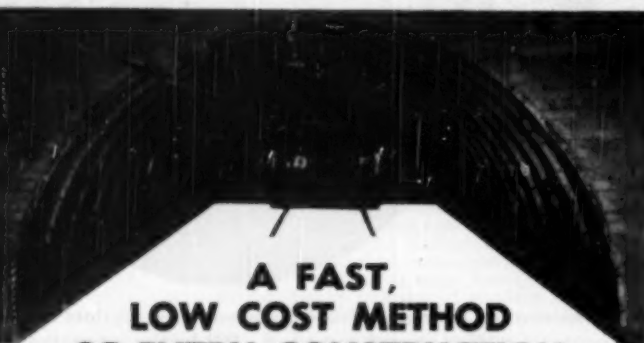
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National Safety Congress

casion of Dr. Vorwald's subject.

Practical ventilation and water hazards in coal mines were the topics of two symposiums, also on Wednesday afternoon. R. E. Doherty, research engineer, Anthracite Institute, Wilkes-Barre, Pa., speaking for Author W. R. Devens, ventilation engineer, Glen Alden Coal Co., Wilkes-Barre, Pa., and F. J. Petermann, safety engineer, Union Pacific Coal Co., Rock Springs, Wyo., described practical ventilation methods for anthracite and bituminous, respectively. On the subject of water hazards in coal mines, C. H. Maize, mine inspector, Pennsylvania Department of Mines, Gray, Pa., described water problems in bituminous mines; and S. H. Ash, chief, safety branch, USBM, Washington, D. C., outlined the anthracite water problem.

Concurrent studies of mine atmospheres and the physiological effects of dust on mineworkers are necessary to provide the knowledge required to control the silica hazard, Dr. Vorwald declared. On the basis of studies in six bituminous coal mines, Dr. Vorwald pointed out that chemical determinations of crystalline free-silica percentages in the in-place strata were not wholly reliable in predicting the amount of harmful air-borne dust that would be present under actual working conditions. Structure, as well as mineralogy, affects dustiness. Therefore, sampling of air-borne dust should continue, whether or not chemical analysis is done, Dr. Vorwald concluded. Although the mines studied complied with and sometimes exceeded the minimum requirements of state and federal laws, from 0.3 to 0.7% free silica in harmful sizes was found in return airways. This is the dust to which the men are exposed.

Noting that the use of water sprays materially reduced the air-borne dust hazard, Dr. Vorwald suggested that allaying methods be continued to keep dust counts below 50 million particles per cu ft of air for dusts containing not more than 5% free silica, with particle size not larger than 5 microns. This suggested threshold value is subject to adjustment as further experiments show the need for such revision.

Agreeing that more research is necessary and that sampling of air-borne dust is indispensable, Mr. Owings pointed out that the Bureau of Mines suggests a dust-count threshold value of from 20 to 40 million particles per cubic foot of air, with a silica count of not over 5 million particles per cubic foot.

Vertical drilling appears to give higher dust counts than horizontal drilling with percussion tools, Mr. Owings stated in pointing out the need for effective dust collectors for roof bolting. Also, most dry dust collectors employ rubber washers to deflect dust-laden air into the collector, with any wearing away of the washers permitting dust to escape.

In presenting an abstract of Mr.



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Devens' comprehensive review of the history and principles of anthracite ventilation, Mr. Doherty stated that insofar as elimination of recognized hazards is concerned, anthracite ventilation is improving. Proof of this is in the reduction of federal-inspection items pertaining to hazardous or substandard ventilation. On the other hand, five of the 83 fatalities in anthracite deep mines in 1949, resulted from explosions of gas, thus establishing the challenge to be met by anthracite ventilation engineers. Additional fans, improved dust control and safety training of mineworkers hold promise of helping to reduce accidents attributed to ventilation.

Emphasizing the safety and monetary benefits of good ventilation, Mr. Peternell suggested the maintenance of a solid pillar between intake and return, strict maintenance of stoppings to prevent leakage, and adequate area in openings to permit good ventilation as workings expand. Such practices will put adequate air at the face without penalizing the operator by forcing him to operate at a high water gage with accompanying high power costs.

Relocation of fans and construction of new air openings cut power costs 50% at a Union Pacific property, Mr. Peternell reported. Also, good ventilation engineering minimizes the effects of dust, carbon monoxide and other harmful agents in mine air, as shown by results of a survey conducted at Stansbury mine by the Industrial Hygiene Section of the Wyoming Department of Public Health.

In outlining the circumstances surrounding catastrophes and near-catastrophes resulting from intrushes of water into Pennsylvania bituminous mines, Mr. Maize pointed out the reasons for the accidents and the lessons to be learned therefrom. In addition to sound judgment and precise engineering study of the particular situation to be faced, Mr. Maize offered the following suggestions:

1. Keep surface flood waters out of workings by providing dikes or dams at crop openings where flood waters might enter, and separate abandoned crop workings from active workings by substantial underground dams.
2. Keep accurate maps, posted from frequent surveys, with elevations taken from the same bench mark as the elevations of adjoining mines.
3. Approach abandoned mines or portions of mines with utmost caution.
4. Maintain adequate barrier pillars against any possible head of water.

The urgency of the water problem in the anthracite region was established by Mr. Ash in his statement that 19 tons of water now are pumped to the surface for every ton of underground production. Some companies pump from six to eight abandoned mines to keep pressure against bar-

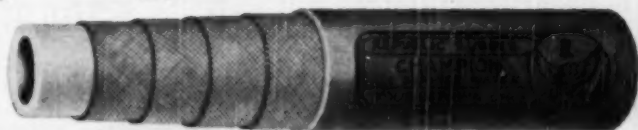


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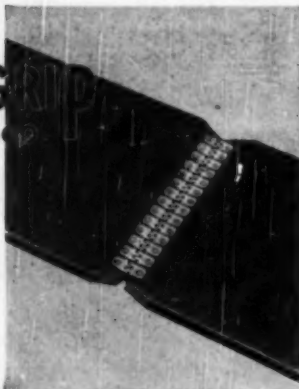
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COAL MEN ON THE JOB



SCANNING THE MINE MAP—R. B. Rogers (left), chief electrician, Central Coal Co., Monterey, Tenn.; Grant F. Hall, Coal Operators' Casualty Co.; and W. W. Clemons, general mine foreman, Central Coal Co.

National Safety Congress

riers in active workings at a safe level.

Present proposals for handling the water include diversion of surface streams, central pumping stations and a drainage tunnel from the region to tidewater, Mr. Ash said, with a combination of the latter two proposals probably most feasible. Preliminary surveys to establish a route for the tunnel and necessary laterals are underway, and a decision to proceed with the tunnel will depend on results of the survey. The proposal being studied involves driving a pair of concrete-lined bores from the region to Conowingo, Md., a project greater in scope than any of the large water-supply facilities now in existence, Mr. Ash said.

Safety in machine design, electricity and communications, and improvements in mine lighting were topics of the Thursday afternoon session, with speakers as follows:

W. D. Northover, safety engineer, Rochester & Pittsburgh Coal Co., Indiana, Pa., who presented a paper authorized by J. J. Snure, production manager; G. F. Prideaux, illuminating engineer, General Electric Co., Cleveland, Ohio; Prof. George C. Barnes, Jr., Department of Electrical Engineering, Virginia Polytechnic Institute, Blacksburg, Va.; and Evan Adams, assistant mine superintendent, Hanna Coal Co., Piney Fork, Ohio.

Commenting on the need for including safety considerations in the design of mining machines, Mr. Snure said that, since the safety record is the barometer of operating efficiency, equipment should be designed after discussion among manufacturers and operating and safety representatives

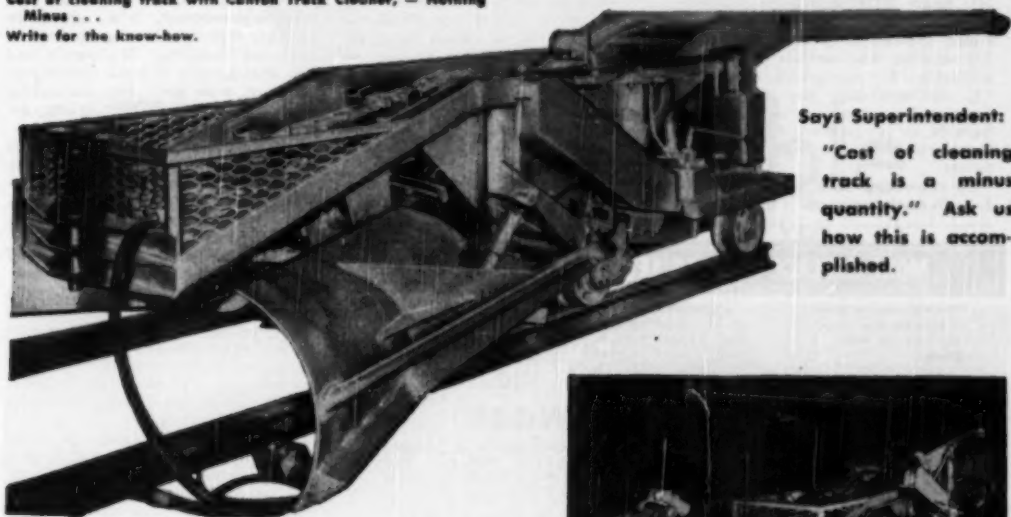
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of mining companies. Then, equipment should be rigidly tested under actual operating conditions before the final model is placed in service.

Specific recommendations offered by Mr. Snure were: (1) place manhole covers in easily accessible places to guard permissibility at such points, (2) consider dual controls to increase protection for equipment operators, (3) eliminate dirt- and oil-catching recesses and projections to reduce fire hazards, in (4) improve dust-allaying equipment and (5) strengthen trailing cables.

In discussing safety in design, A. Lee Barrett, research and develop-

ment engineer, Joy Mfg. Co., Franklin, Pa., stated that differences of opinion among men in the industry as to the form of desired safety devices make it difficult for the manufacturer to secure a concise picture of the desired needs. The manufacturers need a crystallized viewpoint of the need as a basis for designing equipment, he pointed out. Good maintenance, resulting from effective training of mechanics and electricians, will help increase safety in using machinery, Mr. Barrett added, in describing a training course at Joy's Franklin plant now available to coal-company personnel.

With the federal code prohibiting lighting circuits within 150 ft, the

best approach to increasing illumination at the face is in the current and steady improvement of electric cap lamps, Mr. Prideaux said. A more basic factor, however, is the physical act of seeing, Mr. Prideaux added. Seeing is affected by size of objects, time of observation, brightness and brightness-contrast, with efforts to increase contrast showing the way to improved visibility. Whitewash and rock dust greatly increase visibility at the face, with rock dust surpassing whitewash as an aid to visibility, according to data on reflection factors.

In safety, the focus of attention has been on electricity, Prof. Barnes said, because of the hazard of fires and explosions resulting from electrical ignition. Illustrating his remarks with blackboard sketches, Prof. Barnes described mine-power distribution and the isolation of circuits for safer operation. The shortcomings of solid frame-to-ground connections may be eliminated by the use of circuit breakers in feeder lines and ground-current relays in the solid ground to open the breakers when ground current flows. Adoption of ac circuits and equipment will increase safety by removing commutation sparking from the face regions, declared Prof. Barnes, in noting trends toward ac power, trackless mining, isolated-from-earth circuits and ground-current relays to actuate circuit breakers.

In the discussion, H. B. Buckingham, electrical engineer, coal mines, Tennessee Coal Iron & R. R. Co., Birmingham, Ala., described safety circuit centers, now in use at TCI mines, which have reduced the hazards of shock, ignition and cable fires. In commenting on the ground-current relays, an integral part of the safety circuit centers, Mr. Buckingham pointed out that there are practical limits to the minimum current-setting of such relays, and suggested 8 amp as a practical setting. Current settings that are too low cause the circuit breaker to kick out unnecessarily.

Mr. Barrett stated that stray currents sometimes have enough intensity to operate the relay if the setting is too low.

Fast, accurate communications by radiotelephone has increased safety and efficiency at Hanna Coal Co. mines, Mr. Adams said, by permitting closer contact between haulage crews and dispatcher. Heretofore, the dispatcher had to wait until he was called on the telephone by the motor runner, but now urgent messages can be relayed at will. In addition to promoting smoother haulage, the trolley-phones speed up supply-handling and ease maintenance problems by providing quick communications with these other services.

With regard to cost, Mr. Adams pointed out that with 14 units in service, maintenance charges are about \$4 per mo per unit, and the total cost per unit is approximately \$720, including installation, labor and a supply of spare parts.

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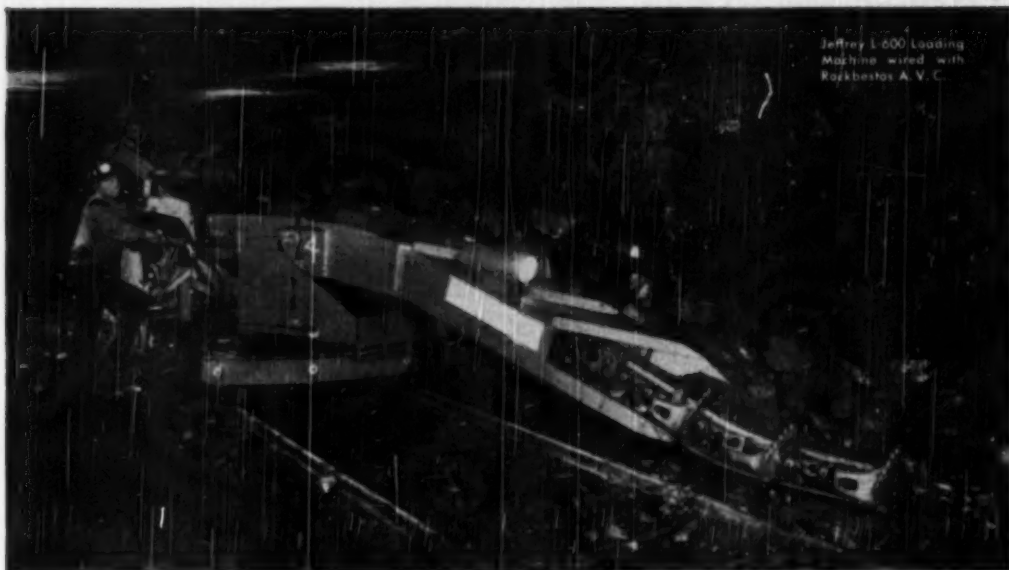
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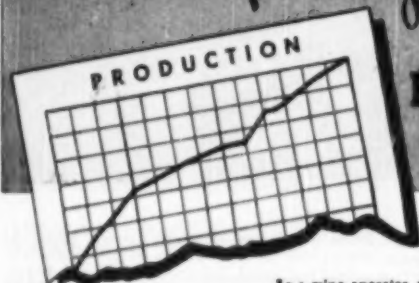
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Joint Fuels Conference Scans Coal Technology

. . . Begins on p 140

must produce goods and services, said H. G. Dyktor, commissioner, Division of Air Pollution, City of Cleveland. Mr. Dyktor spoke at the luncheon meeting Tuesday, with Elmer Kaiser, assistant director of research, Bituminous Coal Research, Inc., Columbus, Ohio, presiding. Citing the sources of air pollution, including traffic, demolition, construction, railroads, incomplete combustion and emissions from factories and plants, Mr. Dyktor declared his opposition to federal air-pollution legislation and restrictive and punitive local laws. Cleveland industries in 1949 spent over \$4,400,000 to decrease air pollution. They did this without threat or prosecution, proving that the major factor in air cleanliness is the cooperation of industry together with annual inspections of equipment, Mr. Dyktor declared.

What will happen to coal in the long-term fuels picture? That was the question raised by H. A. Baldwin, Power Div., General Motors Corp., Detroit, in leading off the Tuesday afternoon session.

In past years, the coal industry operated from one crisis to another, neglecting its public relations, failing to formulate industry-wide policies and occupying itself with internal competition, Mr. Baldwin declared. Most advances in the use of coal have been made by outsiders and progress in mining methods has been spurred not by outside competition but by competition within the industry. Thus, unfamiliar with the tactics needed for inter-fuels competition, coal has fought oil and gas with the wrong weapons; that is, publicizing the danger of fire and explosion with other fuels, pointing out inadequate reserves of oil and gas and resisting the growth of competing fuels by appeals to Washington lawmakers and bureaus. The best competitive approach for coal is to find out what the customer wants, develop more and better ways to use coal and then sell coal on its merits.

The industry's plight is not altogether of its own making, having grown partly out of high labor costs and repeated interruptions of supply, Mr. Baldwin pointed out. Looking to the future, he predicted lower production and higher costs, a real threat to nationalization unless the industry can make a fair profit, a failure of further appeals for help to the government, and further market losses unless the industry can turn out a consistent product at a cost level that will economically compete with other fuels.

Mr. Baldwin's address provoked some lively discussion, led by B. A. Landry, Battelle Memorial Institute; J. B. Morrow, Pittsburgh Coal Co.; and Mr. Kaiser, BCR. These speakers



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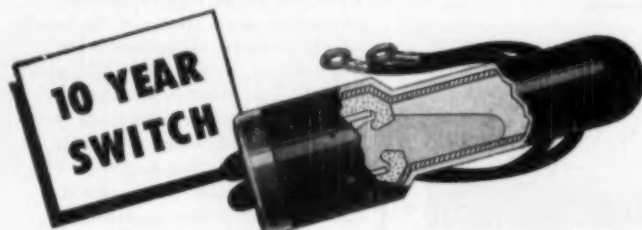
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COAL MEN ON THE JOB



UNDERGROUND IN KENTUCKY AND ILLINOIS—K. B. Deal (left), mechanization engineer, Inland Steel Co., Wheelwright, Ky. At the right, John Sharkness, foreman, No. 9 mine, Old Ben Coal Corp., W. Frankfort, Ill., inspects a special seal put up during shaft-bottom reconstruction.

Joint Fuels Conference

pointed out the progress the industry has made in the last 15 yr in research, development and public relations and urged the industry to continue in every way its efforts to increase the markets for more energy and power. Mr. Morrow predicted that in the future present natural-gas pipelines will be useful in transporting gas made from coal.

A program for electric-utility coal purchases was outlined by Marshall Pease Jr. and R. J. Brandon, The Detroit Edison Co., Detroit. Reporting that his company's generation of power now is 24% above 1949 levels, Mr. Pease explained Detroit Edison's policy on coal purchases. That policy involves: (1) careful selection of coal, because a private utility must compete with government-built utilities; (2) sticking by coal producers who have stuck by Detroit Edison in improving quality and keeping cost reasonable; (3) refusal to play the "spot" market; and (4) reliance on coal as the major utility-plant fuel. Mr. Pease urged coal and the utilities to join in developing better burning equipment and producing higher-quality, lower-cost coal.

The important factors in power-plant coal are ash-fusion temperature and moisture content, Mr. Brandon said. Stating that in 1946 the ash content of coal bought by Detroit Edison reached a high peak and Btu's reached a low, he expressed doubt that with full-seam mechanical mining coal ever will return to the high-quality level of 1940. With greater tonnages of coal needed to generate more power, stockpiling against emergencies and interruptions becomes an urgent problem.

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Joint Fuels Conference

In selling coals from various fields, mine price, freight rate and operating costs, as well as the characteristics of the coal, are considered, Mr. Brandon explained. As for competing fuels, prices fluctuate widely, often without reference to the price of coal. The use of oil sometimes may be justified at any price to meet peak demands and emergencies. Natural gas may be obtained at dump rates, but on an interruptible basis. Even so, gas is not as cheap as it seems because coal facilities and coal-handling labor, which must be kept on a standby basis, have to be figured in the cost of gas. For these reasons and others, the utilities will continue to depend on coal as the basic source of energy, Mr. Brandon concluded.

Industry is the Nation's shield against aggression, declared Elmer L. Lindseth, president, Cleveland Electric Illuminating Co., at the banquet Tuesday evening. Thomas A. Marsh, Iron Fireman Mfg. Co., was toastmaster.

In the present crisis and over the long-term future, business must face up to its responsibilities, Mr. Lindseth said. These responsibilities are to carry out the military program, strengthen the economy for whatever demands may be imposed in the future, avoid inflation and preserve freedom. Stressing the need to produce both guns and butter, he cited the following hazards ahead: a speculative boom followed by a collapse, stagnation of our standard of living leading to social unrest, and destruction of industry's incentive to grow through high taxes.

In this situation, the obligations of business men are: (1) to run their businesses successfully, (2) to support control measures needed for the present, and (3) to intensify the development of executive manpower. A more specific program includes the following steps, though they may pinch and hurt a little: assure the availability of plants and materials, achieve higher productive efficiency, keep inventories at a reasonable level, hold prices down, curtail credit expansion and promote savings-bond sales.

Reducing gross-sample weight without impairment of sampling accuracy was the subject of a joint paper prepared by A. L. Bailey, USBM, Pittsburgh, and Mr. Landry. Mr. Bailey presented the paper at the Wednesday morning session.

Showing data on the variance of laboratory samples of four double-screened sizes of a western Pennsylvania bituminous after an elaborate mixing procedure, Mr. Bailey presented methods and formulas for relating the variance to the sampling characteristics of the coal in terms of the fractions of float, middlings and sink materials. Samples of approximately the same weight for the four sizes gave widely different variances. This

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Indicates the importance played by the size of piece and shows that the mixing index measures a true property of the aggregate and defines variance over a wide range.

It was found that the method of mixing and dividing the gross sample of 2x1-in coal produced the best mixing and therefore required the minimum weight of laboratory and gross samples, Mr. Bailey said. This method was as follows: Without riffing, from each of nine secondary long piles two tertiary piles were formed by alternate shoveling. Then, from each of the 18 tertiary piles, two quaternary piles were made, making a total of 36 samples for float-and-sink separation.

Results of other tests showed that the riffing steps used for the smaller sizes, 1x½ and ½x¼, were not necessary and could be replaced by the alternate method of making tertiary and quaternary piles. Any of these methods is laborious, Mr. Bailey conceded, but there seems to be no alternative.

Applying his procedures and formulas to an illustrative case, Mr. Bailey concluded that accurate results could be obtained in this particular instance by taking a gross sample 36 times as large as the laboratory sample; that is, 1,150-lb gross sample and 32-lb laboratory sample. He warned, however, that the data obtained, though applicable to the particular coal sampled in his experiments, cannot yet serve as a basis for general sampling specifications or standard procedure and that further investigation is needed.

Extensive sampling investigations to determine the variance in percentage ash of samples of one increment each weighing from 14 to 100 lb were reported in a joint paper by Mr. Landry and W. W. Anderson, Commercial Testing & Engineering Co., Chicago. Mr. Landry presented the paper. The studies were carried out at the tipple of the Enos Coal Mining Co., in Pike County, Indiana. Thirty samples of each weight—14, 40, 60, 80 and 100 lb—were taken and each was reduced and analyzed separately. In addition, 60 increments of 50 lb each were taken for size-consist determination of the composite and for float-and-sink separation at seven specific gravities, of the seven size ranges obtained by screening. All samples were run-of-mine collected from the belt.

The investigations show, Mr. Landry pointed out, that the particular strip-mined coal sampled was so well mixed that a state very close to a random arrangement of pieces was achieved. By comparison, the variability resulting from variations in ash contents of the sublots sampled was far more important and was the main component of the observed variance of the samples taken. All together, however, the component



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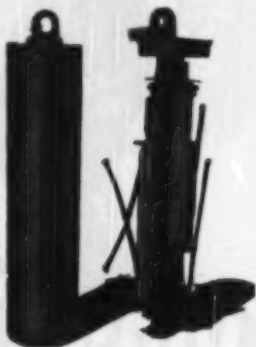
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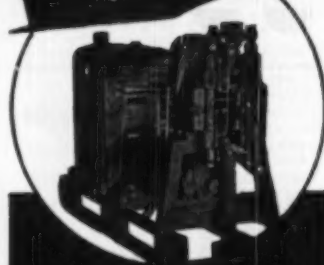
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COAL MEN ON THE JOB



DAWSON COLLIERIES, INC., Dawson Springs, Ky.: Harlan Vaughn (left), lamp-house man; and Ed Miett, blacksmith.

Joint Fuels Conference

variances were small, indicating that very few increments were needed to meet present accuracy standards in sampling this coal. If the variance of increments of large weight is generally as low as it was for this coal, perhaps an increase in accuracy standards may be achieved with mechanical sampling devices simply by taking a larger number of increments, he concluded.

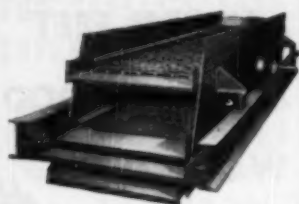
Government encroachments in the electric-power field are a threat to all other industries as well, warned George E. Whitwell, vice president Philadelphia Electric Co., Philadelphia, at the luncheon Wednesday, Carroll F. Hardy presiding.

Citing the growth of privately owned public utilities in the last generation, the increasing competition from government-built plants and the Socialists' plans for enlarging government-owned plants and distribution facilities still further, Mr. Whitwell predicted there would be efforts to use the defense program as an excuse to deprive industry, business and citizens of their liberties. Concluding, he urged resistance to further government encroachments.

Frothability of pine-oil notation reagents is effected by several factors, said Shiou-Chuan Sun, Pennsylvania State College, State College, Pa., in presenting the first paper Wednesday afternoon. These factors are:

1. Chemical composition — The characteristics of the polar constituents of the reagent have an effect on its frothability. The higher the solubility of the compounds of similar structure, the higher the frothing effectiveness is.
2. pH of the solution—Frothability increases with pH.
3. Rate of aeration—Increasing

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the rate of aeration increases the volume of froth and the volume of bubbles.

4. Time period of aeration—After the froth reaches maximum depth at the height of the liquid column, within 50 to 100 sec of the start of frothing depending on the reagent used, time has little or no effect upon froth volume.

5. Concentration of the solution—There is a point of maximum concentration for best frothing.

6. Temperature of the solution—To a certain extent, the higher the temperature, the better and faster the frothing.

7. Height of the liquid column of flotation material—Generally, the higher the column of liquid, the thinner the top layer of froth.

Frothing can be measured accurately by a frothmeter, which measures frothing produced by compressed air, sucked air or vacuum, Dr. Sun explained. Froth stability, he added, is directly proportional to volume of froth.

Dewatering fine coal involves a moisture-retention pattern evolved in laboratory studies said D. W. Gillmore, Pennsylvania State College, who presented a paper prepared jointly with Dr. C. C. Wright. This mois-

ture-retention pattern, shown in gravity drainage of fine coal, comprises a high-moisture region at the bottom of a column of wet coal and a low-moisture region in the upper section. Generally, the height of the high-moisture region and the moisture content of both regions increase as particle size decreases. Blending coarse coal with fine coal and removing the undersize, thus raising the average size of the coal particles in the column lower the moisture retention by the fine coal, Mr. Gillmore reported.

Wetting agents can be used to lower the height of the low-moisture region but they do not greatly improve the drainage rate Mr. Gillmore continued. The wetting agent is rapidly adsorbed by the fine coal and quantities of wetting agents required to improve drainage substantially would add up to high cost. In fact, most of the drainable water runs off within the first few hours anyhow. If a bedding material is to be helpful in drainage it must be located above the high-moisture column and should be made up of the material being drained.

Abrasiveness of coal and its associated impurities was the subject of the final paper of the conference. It was presented by H. F. Yancey, and was prepared jointly by Mr. Yancey, M. R. Geer and J. D. Price, U. S. Bureau of Mines, Seattle, Wash.

USES HANDY GUIDE...



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Mr. L. Arrington, whose photograph is reproduced above, is Chief Electrician for Olga Coal Company, Caretta, West Virginia. As do many others in his field, Mr. Arrington looks to McGRAW-HILL'S PRE-FILED MINING CATALOGS for information that is helpful in his work—and finds it there—as is evident from his recent comment:

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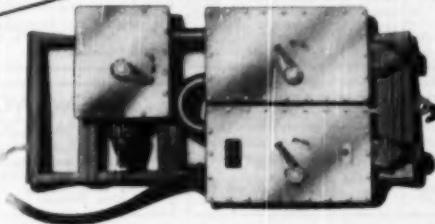
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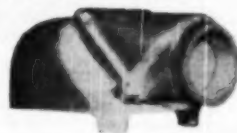
Pointing out that the wear on drilling, cutting and conveying equipment is a significant cost item in coal mining and that operators of pulverized-fuel plants also have experienced wear on coal-handling equipment, Mr. Yancey stated that some way is needed to measure the abrasiveness of various coals. Denying that his investigations had reached a final stage, he suggested that they might serve as a starting point for developing an acceptable test procedure.

The present abrasive-testing apparatus is set up so as to rotate four removable wearing blades in a charge of coal for a fixed number of revolutions. Then the loss in weight sustained by the blades during the test is determined, Mr. Yancey explained.

Abrasion loss on the blades in testing 12 coals ranged from 12 mg with Cush Creek (Pa.) coal to 686 mg with Pennsylvania anthracite. Variables, such as speed and duration of rotation, and weight and size of coal tested, were carefully recorded. Later, some of the coals were cleaned by sink-and-float procedures and tests were run on the coals and their impurities. In every instance, the impurities were far more abrasive than the coal substance itself. Thus, he pointed out, the quantity and character of impurities in coal have a marked influence on its abrasiveness.

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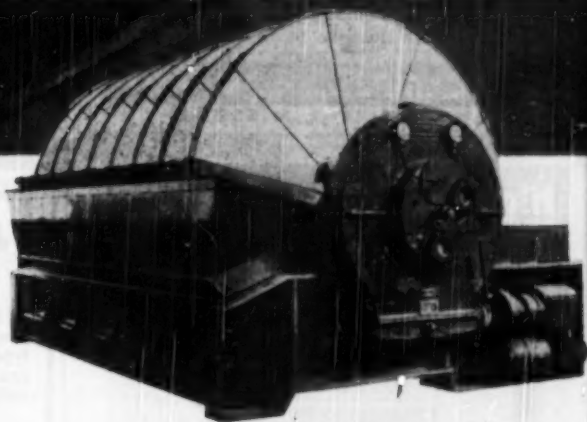
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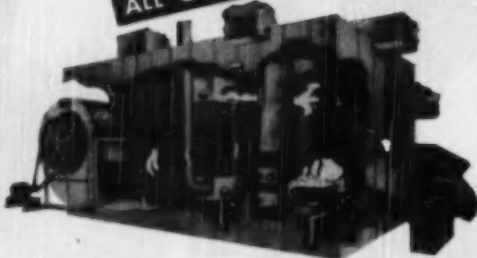
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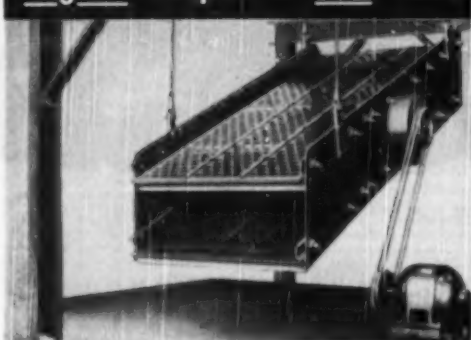
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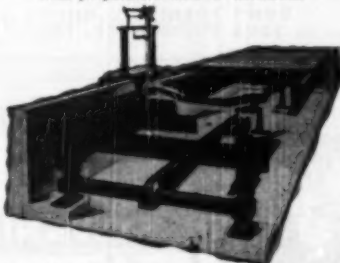
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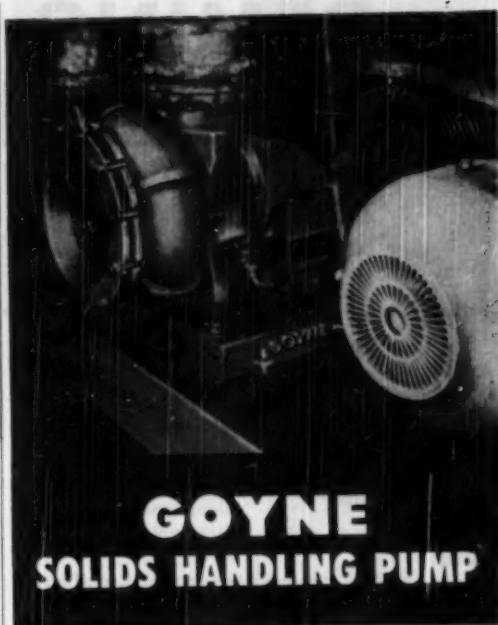
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150	G.E.	400	ATI	S.R.
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- 1-20' Joy 2000' between center.
- 1-20' Goodman, 97C, 1500 ft. between center.

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- 2-512 R2 Shortwall
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Qt.	H.P.	Make	Type	Volts	RPM
1	400	G.E.	KT-113	2300	344
1	400	G.E.	KT-113	2300	416
1	400	G.E.	KT-412	550	450
1	300	Al. Ch.	AR	440	1700
1	250	Whos.	AR	2300	2100
1	200	Al. Ch.	AR	250/440	880
2	125	Al. Ch.	AR	2300	1750
1	125	Whos.	CR-602	440	1750
1	125	G.E.	KT-508	2300	875
2	125	C.W.	1200	440	420
1	100	Whos.	CR-602	440	1750
1	100	Al. Ch.	AR-226	2300	1100
5	100	F.M.	HR-2610	440	880
1	100	Al. Ch.	AR	250	600
1	100	F.M.	H-241R	440	450
1	100	Whos.	CR-908	2300	514
1	100	Al. Ch.	AR	440	405
1	75	G.E.	I-15-K	220	570
2	75	Al. Ch.	AR	2300	1750

SYNCHRONOUS MOTORS

3-Phase, 60-Cycle

Qt.	H.P.	Make	P.F.	Volts	R.P.M.
1	1500	Whos.	.8	2200	720
1	700	G.E.	.8	2300	720
1	450	G.E.	.8	440	800
1	450	Whos.	.8	440	800
1	200	Al. Ch.	.1	2300	800
2	250	Al. Ch.	.6	2300	514
2	250	Whos.	.6	440	340
1	150	G.E.	.1	2300	900
1	150	G.E.	.8	500	450
1	150	G.E.	.8	2200	400
1	125	Al. Ch.	.1	4000/2400	900
1	125	Al. Ch.	.8	2300	900
1	100	Whos.	.1	2300	1000
1	100	Idral	.8	440	800
1	100	G.E.	.8	440	800
1	80	G.E.	.8	440	1300
2	50	G.E.	.8	2300	600

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Qt.	H.P.	Make	Type	Volts	RPM
1	1000	Al. Ch.	ANY	2300	320
1	1000	Whos.	CW	2300	444
1	400	G.E.	MT-412	2300	710
1	400	G.E.	I-14-M	2300	450
1	400	G.E.	MT-574	550	580
1	400	G.E.	I-M	2300	590
1	400	Al. Ch.	ANY	2300	600
2	400	G.E.	MT-412	2300	440
1	300	G.E.	I-F-15-M	2300	1700
1	300	Al. Ch.	ARY	2300	500
1	250	Whos.	CW-1100	2300	500
1	250	Whos.	CW	550	514
1	250	G.E.	MT-414	2300	500
1	200	G.E.	I-M	2300	600
1	150	G.E.	I-1013 M	2300	1750
1	125	Whos.	CW-870	2300	900
1	100	Al. Ch.	ARY	440	1100
1	100	F.M.	420-C	440	900
1	75	G.E.	I-M	440	800
1	50	G.E.	MT-536	2300	1150
1	50	Al. Ch.	ARY	440	800

***—Mill type pedestal bearing. ***—3-bearing.

TRANSFORMERS (Oil Cooled)

Qt.	K.V.A.	Make	Phase	Volts
1	4500	G.E.	3	27000/13200/7200
2	4000	G.E.	3	22000/2200/4000V
2	2750	Whos.	3	67000/14400/2400
1	2750	Whos.	3	67000/2400
4	500	G.E.	HT	2 14400/12200/400
1	500	G.E.	H	1 12200/11800/230/440
3	300	Pitts	OHRC	1 14400/12200/220/440
30	100	G.E.	HT	1 14400/12870/240/400
1	100	Whos.	ALTO	1 2400/1340V/1300/2400V
2	100	Whos.	HN	1 12870/5800/230/440
2	75	G.E.	KF	1 2400/1100V/120/240

MOTOR GENERATOR SETS

Qt.	KW	Make	R.P.M.	Volts
1	750	Whos.	900	2300
1	750	(3U)	120	2300
1	600	G.E.	120	2300
1	500	Al.	720	525
1	500	(3U)	Whos.	1200 120/240 4000/2300

1	200	Whos.	600	2300
1	200	Bludmeyer	600	275
1	185	G.E.	720	250
1	150	Al. Ch.	1200	250
1	150	Bludmeyer	1200	275
1	85	C.W.	1200	250
1	75	Whos.	900	75
1	75	Al. Ch.	900	250
1	75	Rear	1200	250
1	50	Bludmeyer	1750	250
2	25	Whos.	1200 120/240	440/230

DIRECT CURRENT MOTORS

Qt.	H.P.	Make	Type	RPM
4 xxx	800	Whos.	Reel (Reel)	600
1	600	Al. Ch.	MIII	400/1300
1	250	G.E.	C D 169	1150
1	225	Whos.	Q M	400/900
1	200/250	G.E.	Dy.	252
1	200	Whos.	M III (Reel)	300/1300
1	150	G.E.	M P C	400
1	150	Al. Ch.	M III (Reel)	400/1300
2 x	150	Cr. Wh.	B H	400
1 xxx	125	Whos.	61C-190	600
1	100/125	Reel	1905 F	300/1300
1	100	Reel	1610 T	400/1300
1 x	90/160	G.E.	MTVI	650/1150
1 x	50/75	Reel	1905 F	300/1300
1	50/75	Whos.	RA 151 L	400/1300
1	40	Al. Ch.	E 127	850/1750
1	40	G.E.	CD 125	400/1300
1	35	G.E.	CD 147	300/1300
2	35	G.E.	RF 14	300/1300
2	35	Reel	15 B	250/1000
1	32 1/2	Whos.	RR 150	400/1200
30	30	Al. Ch.	E 145	400/1300
1	27 1/2	Whos.	COKE 165	400/1300
1	27 1/2	Reel	15 B	400/1250
1	25	G.E.	RF 13	400/1300
1	25	G.E.	CD 125	400/1300
1	25	G.E.	RF 13	400/1300
1	25	Whos.	RR 111 L	250/1000
1	20	Al. Ch.	E 127	400/1300
3	20	Whos.	RA 130	375/1500

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- 4—215 Jeffrey Machines 220 Volts D.C.
- 1—133B Jeffrey Machine 220 Volts A.C.
- 6—C.E. Sullivan Machines A.C. and D.C.
- 2—7B Sullivan Machines 250 Volts D.C.
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1—32 1/2 Vulcan Single Drum, direct geared to a U-6 International Gas. Power Unit.
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- 1—D-4400 Caterpillar V-belted to a 30 KVA 220 volt Fairbanks-Morse AC Generator, complete with switchboard.

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- 1—24x24 Jeffrey Single Roll, with or without motor.
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HP	MAKE	TYPE	SPEED	
250	West.	ME	500	
175	G. B.	ME	500	
150	West.	ME	500	
125	G. B.	CD	500	
100	Century	dry proof	1000	
100	West.	ME-100	500	
100	West.	S	500	
75	G. B.	CDM	1000	
60	G. B.	DC-epish proof	500	
40	NEW	West.	ME-125	500

D.C. Generators-250-375 V.				
KW	MAKE	TYPE	SPEED	
250	West.		1500	
200	West.	ME-250	500	
150	West.	ME	500/600	
110	West.	ME-100	700	
100	West.	ME	700	
100	West.	S	500	
100	G. B.		700	
75	Alfa Chalmers		500	
75	West.		500	
75	Alfa Chalmers		500	
60	NEW	G. B.	CD	1150
40	NEW	West.	ME-125	1150

Transformers-1 ph. 60 cy.			
kVA	Make	PRIMARY	Sec.
5	500	G.B.	3000/400
5	300	Maloney	3000/400
5	300	G.B.	5000/4100T
5	100	West.	5000/4100T
3	100	Pgh.	3000/400
1	100	Powerless	3000/400
1	75	West.	3000/400
1	75	West.	12000/4000
1	75	West.	3000/400
1	75	West.	110/200
1	25	Maloney	3000/400

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		Top Cover	Bottom Cover	
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10"	4	1/16"	1/32"	28 Oz.
12"	4	1/16"	1/32"	28 Oz.
14"	4	1/16"	1/32"	28 Oz.
16"	4	1/8"	1/32"	28 Oz.
18"	4	1/8"	1/32"	28 Oz.
20"	4	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
24"	5	1/8"	1/32"	28 Oz.
26"	5	1/8"	1/32"	28 Oz.
30"	4	1/8"	1/16"	32 Oz.
30"	5	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
36"	6	1/8"	1/16"	32 Oz.
42"	5	1/8"	1/16"	32 Oz.
48"	8	1/8"	1/16"	32 Oz.

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Complete with motor and drive.

15 to 20 ton per hour capacity.....\$100.00

20 to 40 ton per hour capacity.....\$200.00

50 to 100 ton per hour capacity.....\$300.00

100 to 175 ton per hour capacity.....\$500.00

TRUCK SCALES

10 ton Truck Scales.....\$400.00

20 ton Truck Scales.....\$600.00

30 ton Truck Scales.....\$800.00

Others to 50 ton capacity. All scales complete with structural steel weightings. Pans and weighing beams for other makes of motor truck scales.

MINE CAR AND TIPPLE SCALES

Single and double truck platforms. Capacities 5 to 20 tons. Priced from.....\$200.00

HEAVY DUTY FLIGHT CONVEYORS

Any length. Flights up to 6' x 24". All welded structural and sheet steel. Heavy duty, double guided heavy duty chain; steel flights to 4' x 84". Electric or gasoline power. Priced from.....\$500.00

PORTABLE FLIGHT CONVEYORS

Mounted on rubber tires and adjustable undercarriage. All welded structural and sheet steel; double guided heavy duty chain; steel flights to 4' x 84". Electric or gasoline power. Priced from.....\$500.00

CONVEYORS - PICKING TABLES

Troughing idler conveyors-picking tables. Any length, belt widths to 60". Priced from.....\$400.00

TROUGHING IDLERS AND ROLLERS

All steel. Interchangeable with other well-known makes. Replaceable precision ball bearings. No bearing adjustments required. Easy to start and will run in cold weather. Heat-proof ball races; maintenance is negligible.

3-roll Troughing Idlers for three sizes:			
14" belt.....	\$30.00	24" belt.....	\$30.00
18" belt.....	\$1.00	30" belt.....	\$5.00
18" belt.....	\$3.00	36" belt.....	\$5.00
45" belt.....	\$30.00		

1-roll Return Idlers for three sizes:			
24" belt.....	\$ 0.00	36" belt.....	\$10.00
30" belt.....	10.00	42" belt.....	11.00
48" belt.....			\$12.00

PREFABRICATED CONVEYOR SECTIONS & ACCESSORIES

Build your own conveyor; we have in stock standard sections, head and tail pulleys, screw takeups, gravity takeups, troughing and picking idlers and return rollers, belting, drives, speed reducers, etc. etc. Phone us your order.

MOTORS - SPEED REDUCERS

100 in stock including DC motors and gearhead. All guaranteed. Priced from 25% of manufacturer's list.

BONDED SCALE & MACHINE COMPANY

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TOUGHEST
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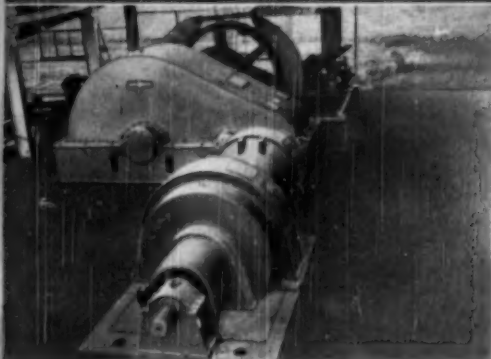
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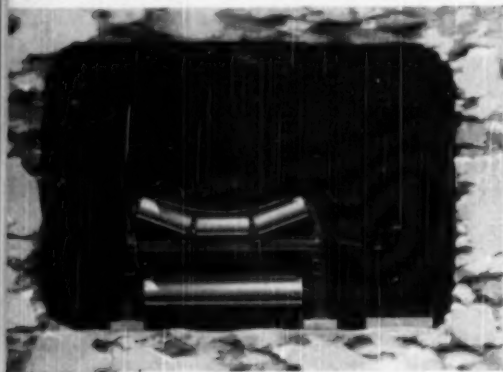
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World's *Highest Lift* Single Belt Conveyor



Terminal drive of this conveyor, consisting of a 1,500 H.P. synchronous motor, a Dynamic clutch and Link-Belt double-reduction Herringbone Gear Drive, operates the $1\frac{1}{4}$ miles of belt at 625 feet per minute through a rubber-covered Link-Belt Welded Steel Pulley. Backstop is a 9-foot diameter mine-type post brake.



Cross section of tunnel showing belt conveyor with Link-Belt Series "100" Roller Bearing Idlers.

LINK-BELT COMPANY

Chicago 9, Philadelphia 40, Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 13, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis 1, Seattle 4, Toronto 8, Johannesburg.

U.S.

This single-flight Link-Belt Belt Conveyor at Orient Mine No. 3 of Chicago, Wilmington & Franklin Coal Co., near Waltonville, Ill., achieves another new high in slope haulage—862 feet vertical lift and 3,167 feet horizontal distance. The 42-inch wide belt conveyor delivers 1,200 tons of coal an hour in an uninterrupted stream from slope bottom to tipple.

Another Mine-Haulage Dream Comes True

How often has it been dreamed and wished—to haul coal from mine level to tipple in a single flight in a steady, even flow? Operators of this Illinois coal mine consulted with Link-Belt and turned ideal slope haulage from dream to reality.

Wherever applicable, Link-Belt conveyor slope haulage has the advantage of volume capacity, low-cost-per-ton of coal handled, uniform delivery, low maintenance cost, less wear and tear on mine cars and increased safety.

Link-Belt has engineered and built the longest slope haulage conveyor in coal mining (10,900 feet), the widest (72 inches) and now the highest vertical lift (862 feet). With this background of experience, Link-Belt can bring to your haulage problems a practical analysis and integration of proven equipment for the ultimate in performance and economy. Ask our nearest office.

LINK-BELT



COAL PREPARATION
and HANDLING EQUIPMENT